PROJECT NO.	ORIGIN	CONTRACTOR CODE	DISCIPLINE	DOC. CODE	SYSTEM	SEQUENCE NO.	SHEET NO
	SK	AKRBP	U			1018	

KEY REFERENCE DOCUMENTS

TITLE	**Storklakken – Basis of Design**

REV	ISSUE PURPOSE	Reason For Issue	CREATED BY		CHECKED BY		APPROVED BY	
			APP	DATE	APP	DATE	APP	DATE
P1	R	Issued for review	HBE	22.02.17	SPE	22.02.17	TNY	
A	A	Issued for use	HBE	28.02.17	SPE	28.02.17	TNY	
B	A	Issued for use	HBE	21.03.17	SPE	21.03.17	TNY	
C	A	Issued for use	HBE	11.04.17	SPE	11.04.17	TNY	
D	A	Issued for use	HBE	01.06.17	JV	01.06.17	TNY	

Issue Purpose
R: Issued for review / comment
A: Approved for use/Issued for Construction/Information
X: As-Built
V: Void (Cancelled)
S: Superseded

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REVISION LOG

Revision code	Date	Section / page no.	Description
P1	22.02.2017	All	Issued for IDC.
A	28.02.2017		Issued for use
B	21.03.2017	Minor updates	Issued for use
C	11.04.2017	Updates	Issued for use
D	01.06.2017	Updates	Issued for use

1 Introduction

1.1 Storklakken overview

The Storklakken discovery in PL460 is located approximately 40km North of Alvheim in blocks 24/3, 25/1 and 25/2 in the Norwegian sector of the North Sea, situated in water depth of 107 meters. AkerBP owns 65% and PGNiG 35% of the PL460 license. AkerBP ASA is the operator in PL 460.

Drilling was completed at the exploration well 25 / 1-11 and a subsequent side-track (25 / 1-11 A) in the Storklakken prospect using the Aker Barents drilling rig. Volumes are estimated between eight and 13 million barrels. A 1m-long gas column has also been proven with good reservoir quality.

The ambition is that Storklakken discovery will be tied-back to the existing Alvheim facilities for further processing and export via the Vilje South Flowbase.

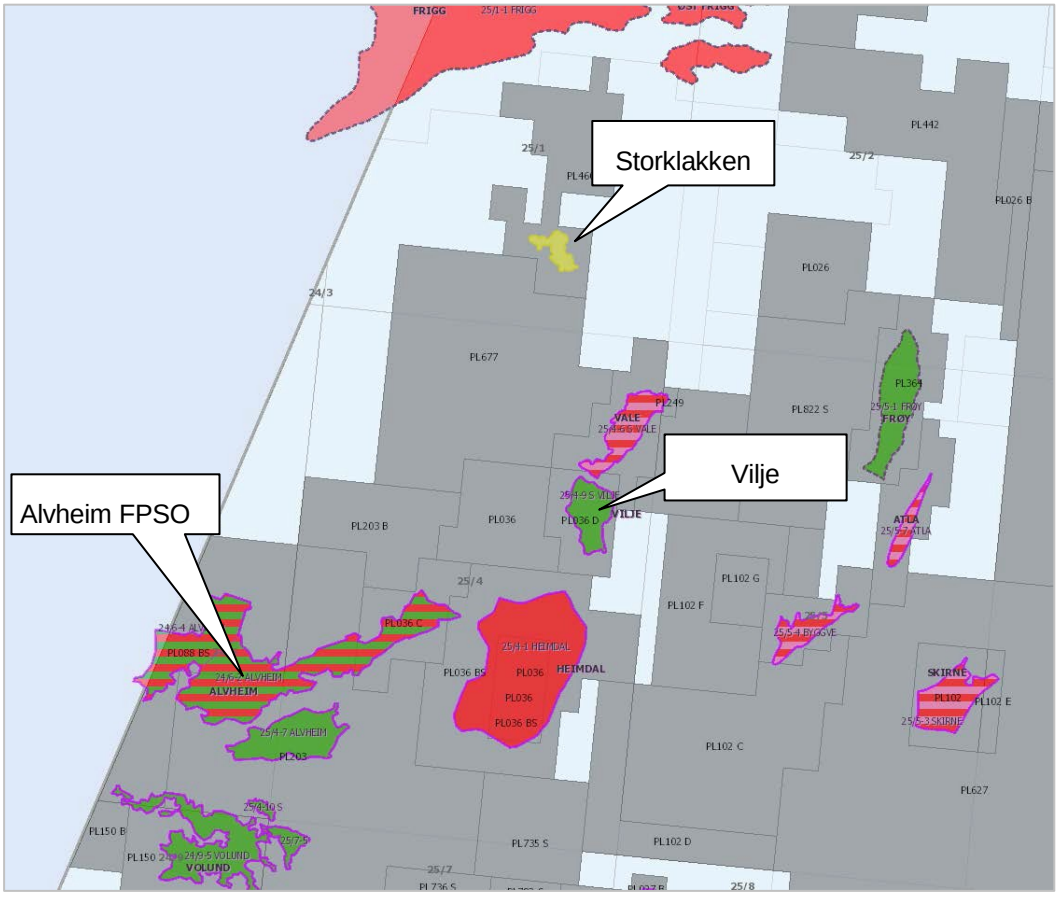


Figure 1: Storklakken field map

1.2 Scope of document

The scope of this document is to define the Basis of Design for the Subsea System on the Storklakken field development and to summarise all input design data required to perform the design of the Storklakken subsea facilities and production system.

The basis of deisgn shall be read in conjunction with reports and documents referenced within this document.

1.3 Definitions

COMPANY (CPY)	AkerBP
CONTRACTOR	AKER/SUBSEA 7/AkerBP (Subsea Alliance)
PROJECT	STORKLAKKEN

1.4 Abbreviations

BLPD	Barrels per day
CMS	Choke and Metering skid
FPSO	Floating production storage and offloading
GRP	Glass-reinforced polymer
HAZOP	Hazard operability study
IMR	Installation, Maintenance and Repair
KBEM	Kneler B Extension Manifold
MEG	Mono ethylene glycol
Mbbl/d	Million barrels per day
mmBOE	Million barrel of oil equivalent
MPFM	Multi-phase flow meter
MSDS	Material safety data sheets
Mscfd	Thousand standard cubic feet per day
mTVD	Meters total vertical depth
OHTC	Overall Heat Transfer Co-efficient (referenced to inner diameter)

PLS	Plastic limit state
PP	Polypropylene
PPM	Parts per million
ROV	Remotely Operated Vehicle
RTJ	Ring Type Joint
SCM	Subsea control module
SDU	Subsea Distribution Unit
SGU	Service gathering unit
SIMOPS	Simultaneous operations
SPS	Subsea Production System
STP	Submerged turret production
VISOP	Valve interlock system for overpressure protection
WAT	Wax appearance temperature
XMT	Christmas Tree

Table 1: Abbreviations

1.5 Codes and Standards

Use latest revision of listed design codes.

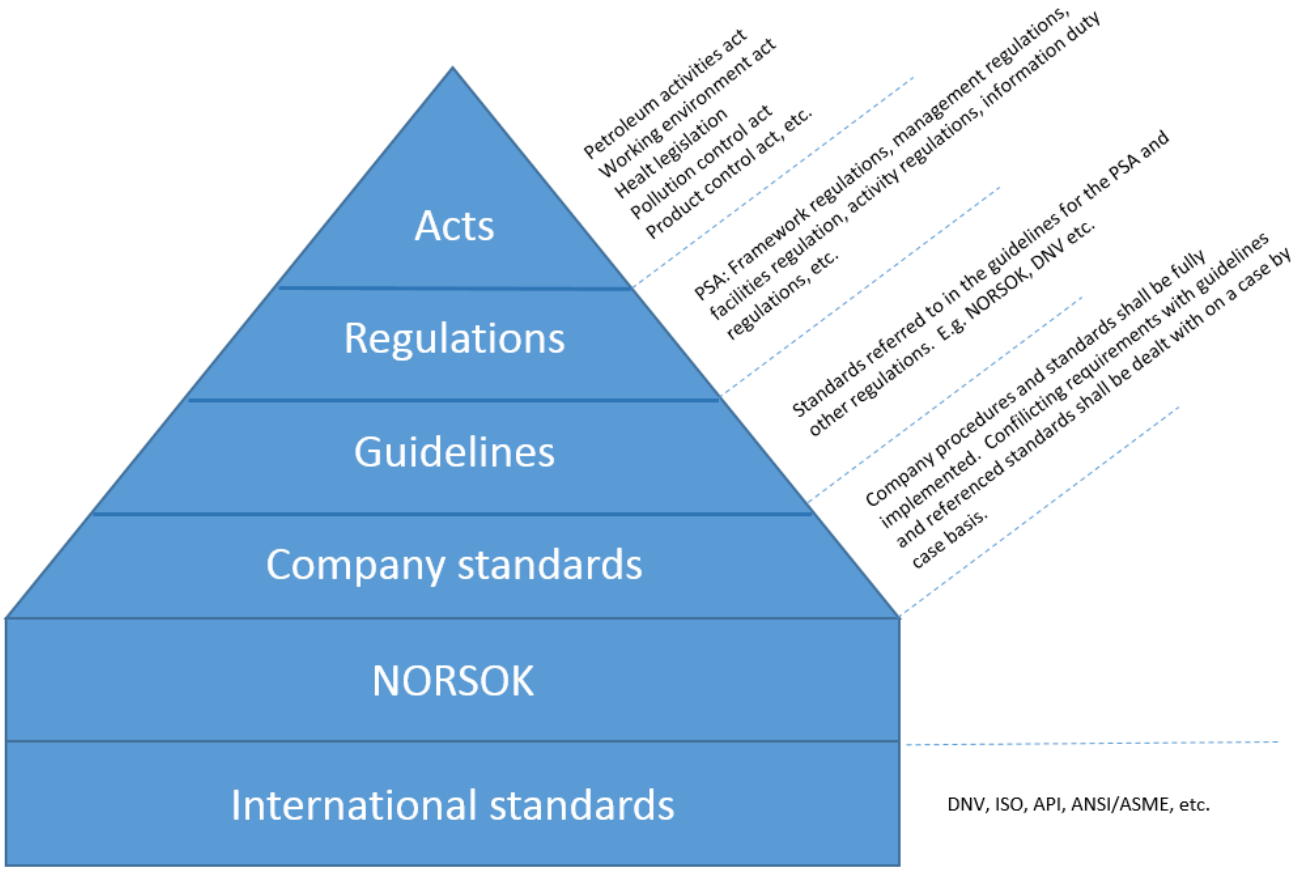
The following priority applies to design codes:

1) Government legislation and legal requirements.

2) Company codes and standards.

3) National (NORSOK) codes design standards.

4) International codes and standards.



Government requirements:

Ref. no.	Number	Title
/1/		NPD Acts and Regulations

Company Standards:

Ref. no.	Number	Title
/2/	53-000180	AkerBP additional requirements to Norsok L-001 - Piping and valves
/3/	53-000190	AkerBP additional requirements to Norsok L-001 - Piping and valves - VDS Generator
/4/	53-000182	AkerBP Additional Requirements to Norsok M-001 – Materials selection
/5/	53-000186	AkerBP Flow Assurance Requirements
/6/	53-000178	AkerBP additional requirements to DNV OS-F101 - Submarine Pipeline Systems

NORSOK:

Ref. no.	Number	Title
/7/	D-010	Integrity in Drilling & Well operations
/8/	D-002	Well intervention equipment
/9/	D-007	Well testing system
/10/	L-001	Piping and valves
/11/	L-002	Piping Design, Layout and Stress Analyses
/12/	L-003	Piping Details
/13/	L-004	Piping Fabrication, Installation, Flushing and Testing
/14/	L-005	Compact Flange
/15/	M-001	Material Selection
/16/	M-101	Structural Steel Fabrication
/17/	M-120	Material Data Sheet for Structural Steel
/18/	M-122	Cast Structural Steel
/19/	M-123	Forged Structural Steel
/20/	M-501	Surface Preparation and Protective Coating

/21/	M-503	Cathodic Protection
/22/	M-506	CO2 Corrosion Rate Calculating Model
/23/	M-601	Welding and Inspection of Piping
/24/	M-630	Material Data Sheets for Piping
/25/	M-650	Qualification of Manufacturers of Special Material
/26/	M-710	Qualification of Non-Metalic Sealing Materials and Manufacturers
/27/	N-001	Integrity of Offshore Structures
/28/	N-003	Actions and Action effects
/29/	N-004	Design of steel structures
/30/	N-004:2013/AC:2014	Design of steel structures - Corrigendum
/31/	R-002	Lifting equipment
/32/	R-003	Safe use of lifting equipment
/33/	S-001	Technical Safety
/34/	S-002	Working enviroment
/35/	S-003	Eviromental Care
/36/	S-005	Machinery working enviroment analyses and documentation
/37/	S-011	Safety Equipment Data Sheet
/38/	S-012	Health, Safety and Enwironment (HSE) on construction-related activies
/39/	U-001	Subsea Production Systems
/40/	U-102	Remotely operated vehicle (ROV) services
/41/	U-100	Manned underwater operations
/42/	Z-006	Preservation
/43/	Z-007	Mechanical Completion and Commissioning
/44/	Z-013	Risk and emergency preparedness assessment
/45/	Z-015	Temporary Equipment

/46/	Z-CR-002	Component identification system
/47/	Z-DP-002	Coding system

DNV:

Ref. no.	Number	Title
/48/	Classification notes - No. 30.4	Foundations
/49/	DNV-OS-F101	Submarine Pipeline System
/50/	DNV-RP-C205	Environmental Conditions and Environmental Loads
/51/	DNV-RP-E303	Geotechnical Design and Installation of Suction Anchors in Clay
/52/	DNV-RP-F101	Corroded pipelines
/53/	DNV-RP-F102	Pipeline Field Joint Coating and Field Repair of Linepipe Coating
/54/	DNV-RP-F105	Free Spanning Pipelines
/55/	DNV-RP-F106	Factory Applied Extarnal Pipeline Coatings for External Corrosion Control
/56/	DNV-RP-F107	Risk Assesment of pipeline Protection
/57/	DNV-RP-F108	Fracture Control of Pipeline Installation Methods Introducing Cyclic Plastic Strain
/58/	DNV-RP-F109	On-Bottom Stability Design of Submarine Pipelines
/59/	DNV-RP-F110	Global Buckling of Submarine Pipelines
/60/	DNV-RP-F111	Interference Between Trawl Gear and Pipelines
/61/	DNV-RP-F112	Design of Duplex Stainless Steel Subsea Equipment Exposed to Cathodic Protection
/62/	DNV-RP-F116	Integrity management of submarine pipeline systems
/63/	DNV-RP-H101	Risk Management in Marine and Subsea Operations
/64/	DNV-RP-H103	Modelling and Analysis of Marine Operations
/65/	DNV-RP-H201	Lifting appliances used in subsea operations

/66/	DNVGL-RP-0002	Intergrity management of subsea production facilities
/67/	DNVGL-RP-0034	Steel forgings for subsea applications
/68/	DNVGL-RP-F102	Cathodic Protection of Submarine Pipelines by Galvanic Anodes
/69/	DNVGL-RP-F113	Pipeline Subsea Repair
/70/	DNVGL-RP-F302	Selection and Use of Subsea Leak Detection Systems
/71/	DNVGL-SE-0045	Certification of subsea equipment and components
/72/	DNVGL-ST-0035	Subsea equipment and components
/73/	DNVGL-ST-E273	Portable offshore units
/74/	DNVGL-ST-N001	Marine operations and marine warranty
/75/	DNV Standard for Certification 2.7-1	Offshore containers

International codes:

Ref. no.	Number	Title
/76/	ISBN 82-91341-89-3	Handbook of multiphase flow metering
/77/	ISO 13628-1	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 1: General requirements and recommendations
/78/	ISO 13628-2	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 2: Unbonded flexible pipe systems for subsea and marine applications
/79/	ISO 13628-2:2006/Cor 1:2009	Technical corrigendum 1
/80/	ISO 13628-4	Subsea wellhead and tree equipment
/81/	ISO 13628-5	Subsea umbilicals
/82/	ISO 13628-6	Subsea production copntrol systems
/83/	ISO 13628-7	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 7:

		Completion/workover riser systems
/84/	ISO 13628-8	ROV interfaces on subsea production systems
/85/	ISO 13628-9	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 9: Remotely Operated Tool (ROT) intervention systems
/86/	ISO 13628-10	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 10: Specification for bonded flexible pipe
/87/	ISO 13628-11	Flexible pipe systems for subsea and marine operations
/88/	ISO 13628-15	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 15: Subsea structures and manifolds
/89/	ASME B16.5	Pipe Flange and Flange Fittings
/90/	ASME B16.9	Factory Made Wrought Steel Butt welding Fittings
/91/	ASME B16.10	Face to Face and End to End Dimensions of Valves
/92/	ASME B16.11	Forged Fittings, Socket-Welding and Threaded
/93/	ASME B16.20	Metallic Gaskets for Pipe Flanges
/94/	ASME B16.34	Valves – Flanged, Threaded, and Welding Ends
/95/	ASME B31.3	Process Piping
/96/	ASME B31.8	Gas Transmission and Distribution Piping Systems
/97/	ASME VIII Div2	Rules for Construction of Pressure Vessels
/98/	ASME Section IX	Code for Welding and Brazing Qualification
/99/	ASME Section V	Code for Boiler and Pressure Vessels Non Destructive Testing
/100/	API 5L	Specification for Line Pipe
/101/	API 5LC	Specification for CRA Line Pipe
/102/	API 6A	Specification for Wellhead and Christmas Tree Equipment
/103/	API 6D	Specification for Pipeline Valves

/104/	API 17D	Design and Operation of Subsea Production Systems – Subsea Wellhead and Tree Equipment
/105/	API 17E	Specification for Subsea Umbilicals

1.6 Holds

Hold	Section	Description

1.7 HSE

HSE shall be addressed in line with existing safety documents and procedures combined with the ''HSE management plan''.

Responsibilities during FEED are as follows:

- The Project Manager holds the overall responsibility for HSE throughout all project phases
- The Project HSE Manager acts on behalf of the Project Manager in matters relating to HSE
- Work Pack Managers and Leads are responsible for HSE within their own area and for contacting the HSE Manager when needed

The project HSE design objectives are:

- Implement in the design process, as a minimum, applicable HSE authority regulations, Company specifications, mandatory national and international codes and standards as well as Consortium's HSE design procedures and guidelines in order to ensure compliance with Company's risk tolerance criteria.
- Identify, evaluate and implement in the design process measures to reduce the risk to a level As Low as Reasonably Practicable (ALARP).
- Implement an inherent safe system design to ensure minimum use of energy and no discharges of substances, which may be harmful to personnel and the environment

Identify, evaluate and implement in the design process measures, which prevent occupational injury or illness during construction, installation, commissioning and operation of the facilities.

2 References

Ref. no.	Number	Title
/106/	TBD	Storklakken Subsurface BOV report
/107/	R70-00498	PVT Analysis of MDT Oil and Water Samples from Well 25/1 11 R, Storklakken
/108/	R70-00511	PVT Analysis of MDT Water Samples from Well 25/1 11A, Storklakken
/109/	SK-DENOR-G-1032	DISCOVERY EVALUATION REPORT, Well 25/1-11 R, -11 A Storklakken
/110/	3202-O-MPC-P-RD-18-0001-00 rev 09	Flow Assurance Handbook – Alvheim
/111/	10002630607 / 3203-S-AKS-U-XB-18-0003	PID XMT Alvheim V
/112/	10001502597 / 32-2K-KOP-P78-00004	XT Production PID, OP4, Vilje Sør SPS
/113/	32-2K-KOP-M57-00001/ 10001502922	Umbilical Cross Section, Vilje South
/114/	32-2K-KOP-C15-00001/ 10001502585	Flow Assurance Analysis, SPS Operability Report, Vilje Sør SPS
/115/	3036-S-TKP-U-XS-00-0001-01	Steel Tube Umbilical, Vilje project
/116/	1000178/32-2K-KOP-M54-00041	Product Data Sheet, iCon SCM, Vlje Sør SPD
/117/	10002924469	Data Sheet LV Bat. Rot. Actuator, ElDrive
/118/	1102105-RR-PT-0001_RevC	SES Analysis of Extreme Displacements Experienced by Subsea Tree Flowline Jumpers of Alvheim Wells
/119/	ALV-A-4020	Prosedyre for mekanisk isolasjon
/120/	NORSOK standard M-001	Materials selection
/121/	3150-S-ACE-U-SA-18-0002-00	Duplex Stainless Steel Specification-Pipe, Bends and Fittings
/122/	ALV-P-4002	Alvheim Kill Well Procedure
/123/	10001477723/ 32-2K-KOP-M78-00003	Schematic XMT Vilje Sør SPS
/124/	10000022428	Hydraulic Flow Diagram SCM, Marathon Alvheim
/125/	10000052793 / 24-KC0742-14	Electrical Wiring Diagram SCM, Marathon Alvheim

/126/	3203-S-MPC-U-FD-00-0007-00	Environmental Conditions Alvheim Field
/127/	10002717572 / 3203-S-AKS-U-XQ-18-00002	Hydraulic Flow Diagram SCM, Alvheim Phase V
/128/	10002717573 / 3203-S-AKS-U-XT-18-00007	Electrical Schematic GA/IF SCM, Alvheim Phase V
/129/	GENSO-P0000-BP-J-FD-0001 Rev.02	AkerBP Subsea Isolation Philosophy

Table 2: References

3 System definition and interface description

3.1 Introduction

The following sections provide detail on the existing subsea facilities and the addition of Storklakken to the Alvheim field.

3.2 Existing subsea facilities

The Alvheim field was developed in 2006 with first product delivery in 2008. The Alvheim FPSO is the delivery and export hub for six independent well centres.

Alvheim is located about 225 km west of Stavanger, approximately 13 km west of the Heimdal platform, and approximately 7 km from the Norwegian / UK border. The field is under the jurisdiction of the Norwegian authorities and at a water depth of approximately 120 metres. The drill centres are located at Boa, Bøyla, East Kameleon, Kneler 'A', Kneler B, Volund and Vilje.

The Kneler and Boa discoveries form part of a development west of Heimdal known as Alvheim that also include previous Kameleon and East Kameleon discoveries. The hydrocarbons are produced through horizontal XMTs to subsea manifolds. The product is then routed via rigid flowlines connected to flexible risers at the riser bases to the Alvheim FPSO.

After processing the product, the oil is exported via shuttle tanker and the gas is exported in a separate flowline to the third party export SAGE pipeline 36 km away in the UK sector. A water disposal line, allowing the FPSO to re-inject the produced water via two produced water disposal wells near the Kameleon field and water injection well at Volund, is also installed.

The Volund water injection well head is connected to the CMS via a flexible flowline.

All information given in this document are based on a tie-back to Vilje Sør, any changes in this will require an update of this document. The Vilje Sør installation consists of a single slot overtrawlable structure including a production guide base (PGB), a flow control module, a X-mas tree and a subsea control module. A multiphase flow meter is included. Gas lift is supplied from the Alvheim FPSO to the Vilje wells. The system shall allow for internal wax and inspection pigging of the production line from Vilje Sør through the existing Vilje line to Alvheim FPSO as today. Pigging of the gas lift line shall also be possible as today. It is not planned for operational pigging. Temporary pig launchers and receivers must be installed for pigging as no permanent pig launchers and receivers will be installed.

The ROV operated tie-in system (RTS) is a tie-in system developed for installation of flexible flowlines and rigid pipes.

Field/facilities location coordinates (UTM, ED50, Zone 31N, 0E to 6E)

Location	Northing	Easting
Storklakken	6628915.8	454119.8
Vilje Sør	6613546	459355
Alvheim	6603827	443408

Table 3: Relevant existing structures in the field

3.3 Storklakken Location

The Storklakken discovery is located approximately 15 km north of Vilje Sør in the production license PL 460 as described in section 1.1

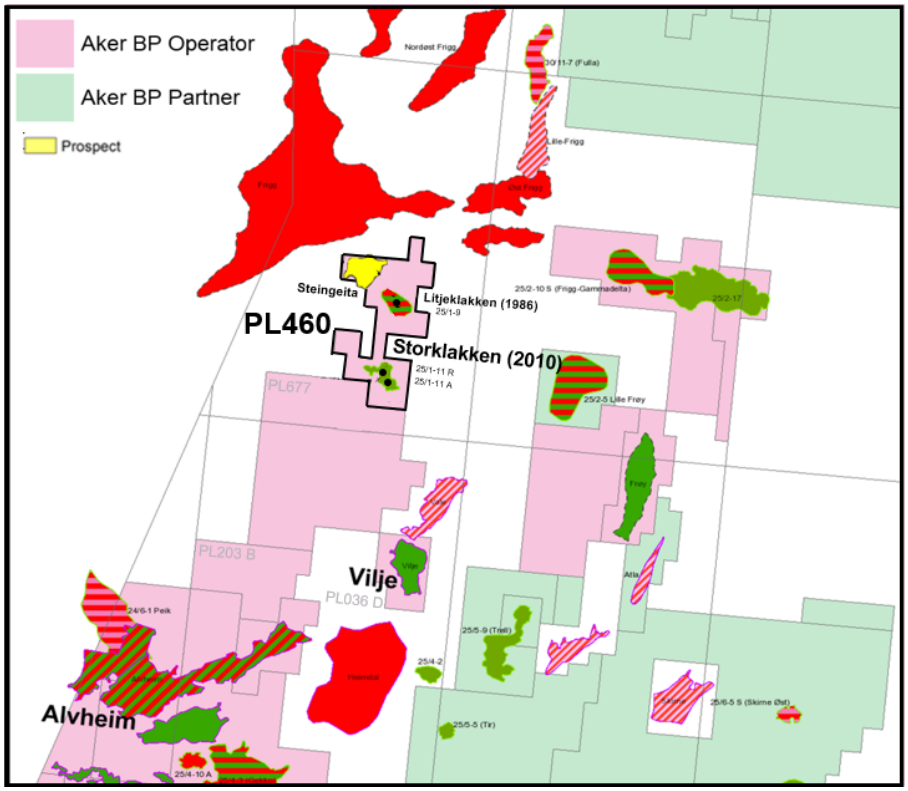


Figure 2: Storklakken location

3.4 Reservoir description

Storklakken is an oil discovery in Eocene Frigg Formation sandstones. The discovery wells showed a thin gas cap over a 20 m oil column in a high permeability sandstone reservoir. Figure 3 is a map of the Storklakken field. This is a depth map of the top reservoir, where the red outline is showing the oil-water contact. The OWC was encountered by well 25/1-11 R at -2126 mTVDMSL, estimated both from logs and pressure data.

The Storklakken field is defined by a structural 4-way dip closure at the upper Frigg sand. The field is located at the distal parts of the deep marine Frigg depositional system and the reservoir sands are expected to pinch out south of the prospect. The reservoir is within the Eocene/Paleocene interval, in the Frigg Formation. The underlying Hermod/Heimdal sands are both water bearing.

Overall reservoir / fluid conditions

- Porosities ~28%
- Permeabilities 1000-1700 mD
- Pres 198.5 bar @ OWC
- Tres 66oC @ OWC
- Fluid density 35o API
- GOR 90 Sm3/Sm3

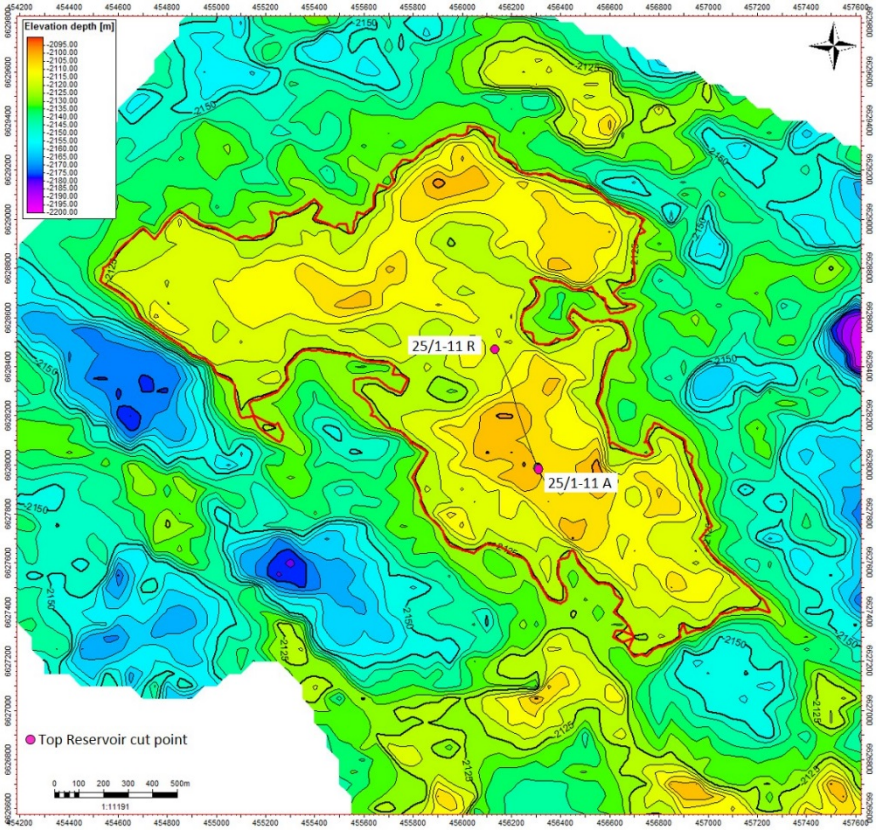


Figure 3: Storklakken top structure map

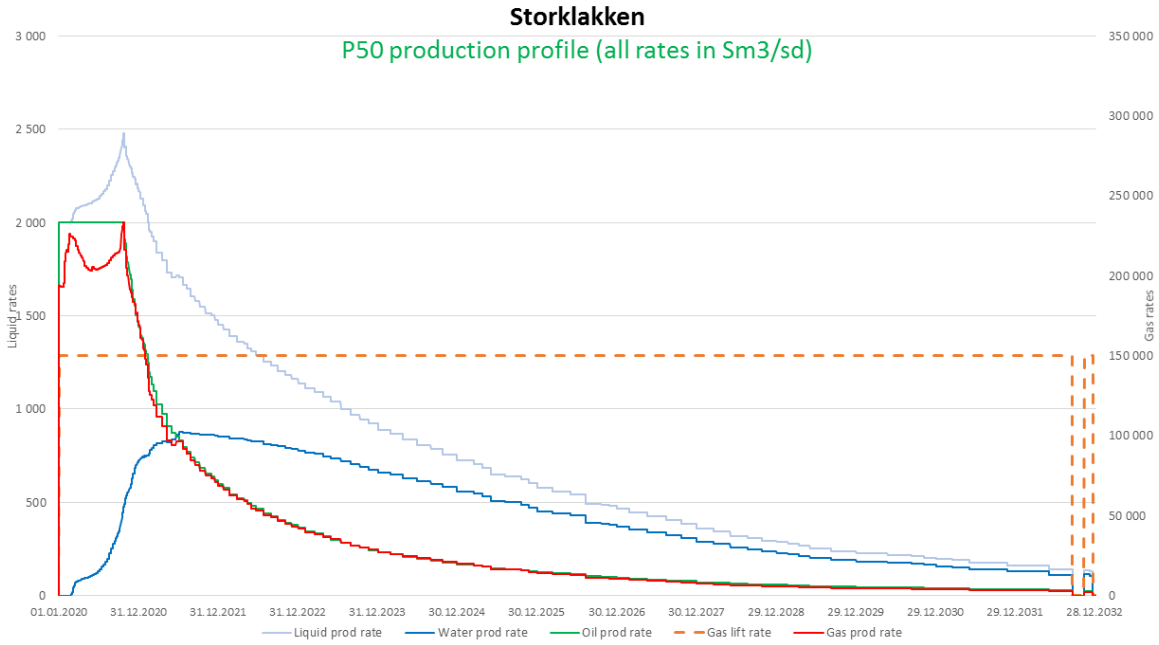
3.5 Production profiles

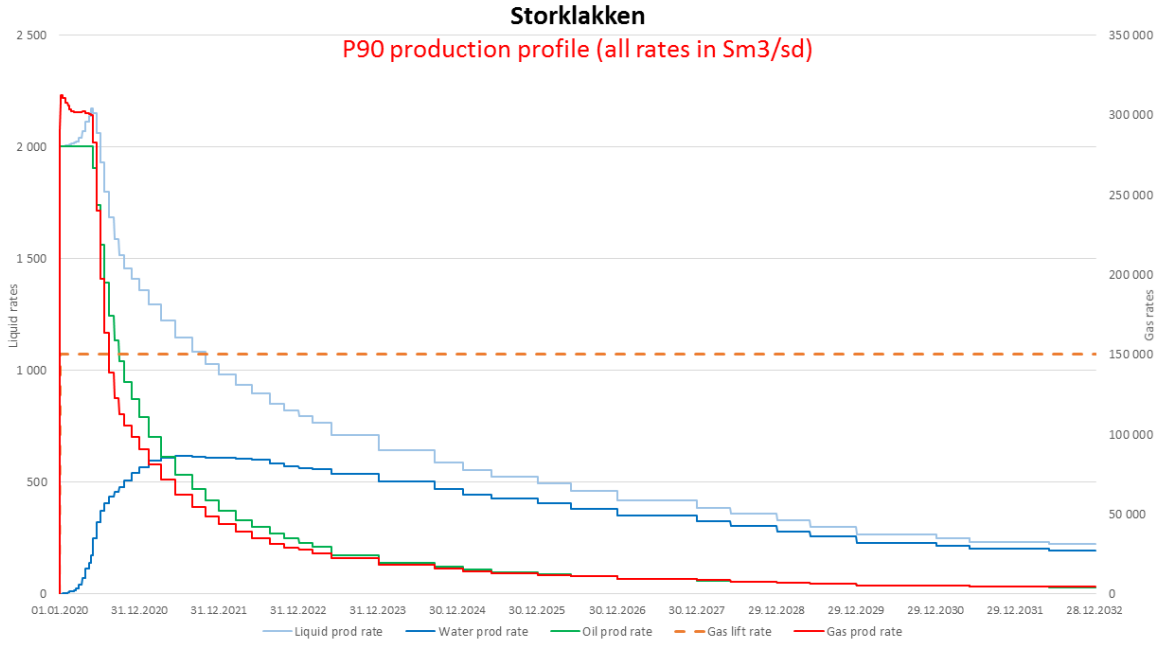
Reservoir simulations have been run to forecast production from Storklakken as tie-back to Alvheim via Vilje. Some basis for the simulations are listed below

- Pressure at Vilje 55 bar
- Pipeline 10''
- Tubing size 5.5''
- Depth gas lift valve 1300 m TVD (required gas lift pressure at start up is 150 bar at Storklakken)
- Depth gas lift valve 1300 m TVD (required gas lift pressure at normal operation is 140 bar at Storklakken, based on 150 bar delivery pressure from Alvheim top side)
- Gas lift rate 150 000 Sm3/sd

DG2 production profiles, including P50, P90 and P10 estimates, are shown in Figure 4.

.


Storklakken
P50 production profile (all rates in Sm3/sd)
Liquid rates
Gas rates
3 000
2 500
2 000
1 500
1 000
500
0
350 000
300 000
250 000
200 000
150 000
100 000
50 000
0
01.01.2020
31.12.2020
31.12.2021
31.12.2022
31.12.2023
30.12.2024
30.12.2025
30.12.2026
30.12.2027
29.12.2028
29.12.2029
29.12.2030
29.12.2031
28.12.2032
Liquid prod rate
Water prod rate
Oil prod rate
Gas lift rate
Gas prod rate


Storklakken
P90 production profile (all rates in Sm3/sd)
Liquid rates
Gas rates
2 500
2 000
1 500
1 000
500
0
350 000
300 000
250 000
200 000
150 000
100 000
50 000
0
01.01.2020
31.12.2020
31.12.2021
31.12.2022
31.12.2023
30.12.2024
30.12.2025
30.12.2026
30.12.2027
29.12.2028
29.12.2029
29.12.2030
29.12.2031
28.12.2032
Liquid prod rate
Water prod rate
Oil prod rate
Gas lift rate
Gas prod rate

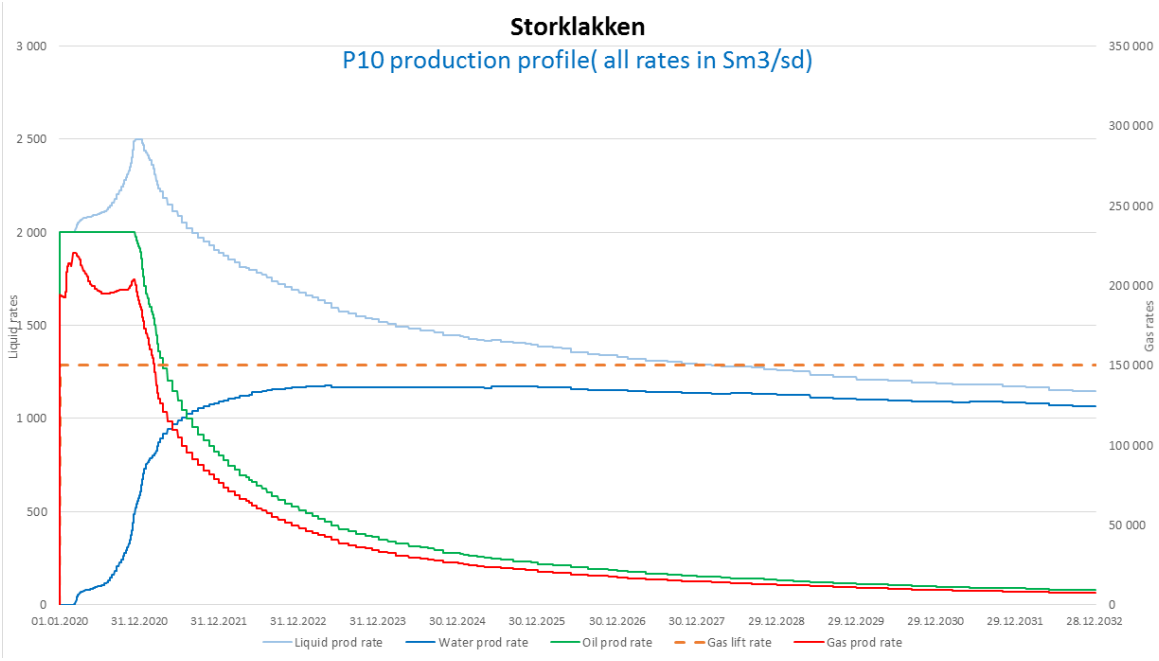


Figure 4: Storklakken production profiles

Minimum design capacities

Fluid	Capacity
Total liquid rate [Sm^3/sd]	2500
Oil rate [Sm^3/sd]	2000
Water rate [Sm^3/sd]	1500
Gas rate excl. gas lift [kSm^3/sd]	200
Gas lift [kSm^3/sd]	150

Table 4: Storklakken design capacities

In define phase a scenario including a cross-flow well ensuring pressure support from underlying formations, will be further evaluated. The expected profiles of this scenario are close to the P10 profile reflected in Figure 4. This is shown in in appendix,

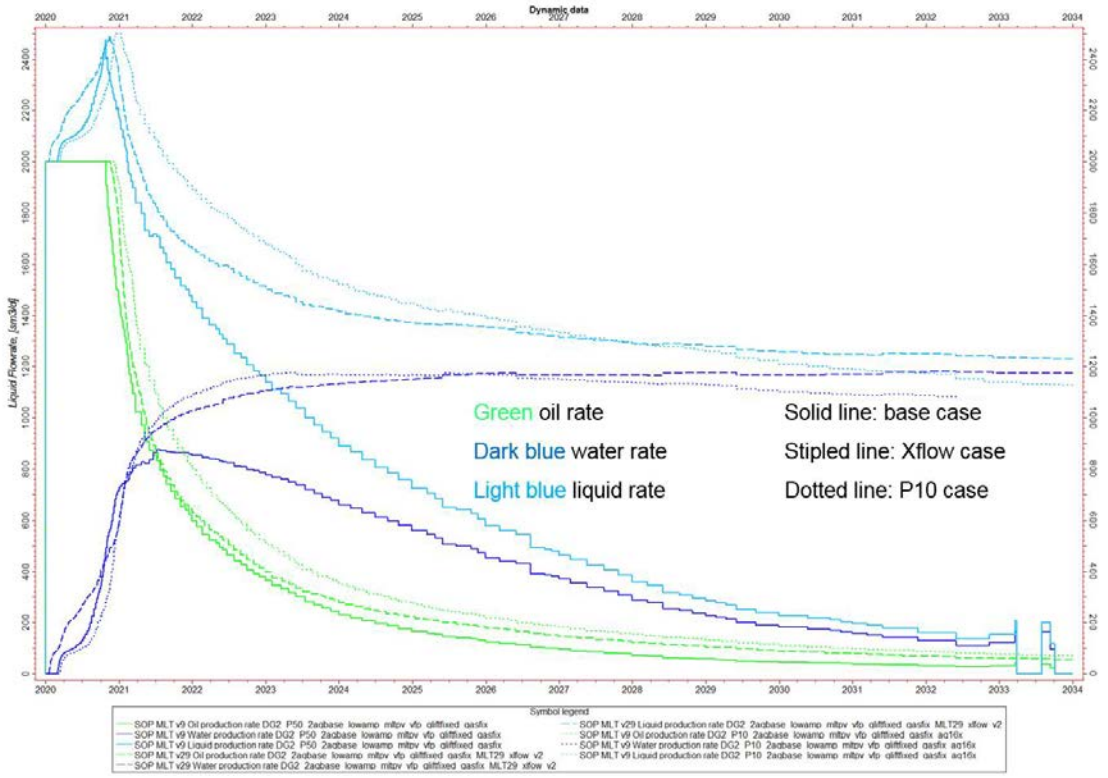


Figure 5: Scenario with crossflow well (X-flow well) shows to be within the P50 and P10 case

3.6 Reservoir Temperature and Pressure

The Storklakken temperatures and pressures are shown in the table below.

Component	Storklakken
Reservoir True Vertical Depth (OWC)	2126 meters
Reservoir pressure at datum (OWC)	198.5 Bara
WHSIP	80 Bara
Initial temperature at datum (OWC)	66 degrees C

3.7 Sand Production

There is no requirement for sand detection on the Storklakken facility, assuming no sand production.

However, it is assumed the existing sand detector located on existing infrastructure shall provide the required alert in the event of sand production.

3.8 Battery limits

System	Start	End
Production	Subsea tie in at Vilje Sør	Subsea tie in XMAS tree at Storklakken.
Gas lift	Subsea tie in at Vilje Sør	Subsea tie in XMAS tree at Storklakken.
Subsea Controls	Umbilical tie in at Vilje Sør	Umbilical tie in XMAS tree at Storklakken.
Subsea Controls	Subsea Controls	Topside Controls

Table 5: Battery limits

3.9 Production system

Production spools	Production spool that connect the production wellheads to the existing Vilje Sør flowbase

Table 6: Production system

3.10 Gas lift system

Gas lift spools	Gas lift spool that connect the production wellheads to the existing Vilje Sør flowbase

Table 7: Gas lift system

3.11 Subsea controls

Umbilical	Umbilical that connect the production wellheads to the existing Vilje Sør flowbase

Table 8: Subsea controls

4 General philosophies

As Storklakken will be tied back to the exiting Alvheim infrastructure, the general philosophies for Alvheim field have been considered.

4.1 Design philosophy

1. The subsea facilities shall be designed so that they can be operated efficiently and safely. Projected capital and operating expenditures shall be optimised to minimise the overall life cycle costs of the field development and operation.

2. The subsea facilities shall be designed with consideration given to the possible use of the infrastructure for future tiebacks from other reservoirs in the area. Pre-investment for such future prospects shall be minimised.

3. A primary objective of design shall be to achieve the most economic yet technically feasible solution for the development.

4. Design of the subsea facilities shall be interfaced with the Alvheim subsea facilities and Vilje (e.g. manifolds, spools) to ensure overall system design integrity and operational safety. Interfacing is considered to be of major importance and shall be addressed at an early project stage.

5. All components of infrastructure shall be protected against external corrosion by a combination of protective coatings and sacrificial anode systems. Coating system design shall consider coating breakdown and damage incurred at installation or in service.

6. To avoid HISC, design of duplex stainless steel subsea equipment exposed to cathodic protection should be according to DNV-RP-F112.

7. Internal corrosion shall be mitigated by the selection of appropriate materials, wall thickness and the injection of corrosion inhibitor where necessary.

8. Material selection for the flanges and fittings shall be appropriate to the service conditions to which the equipment is intended.

9. Suitable block/bleed valves within all structures pipework will provide a safe system to allow the tie-in and testing of the wellhead spools.

10. All permanent blind flanges will have simple block and bleed system to allow future safe intervention for divers.

11. All production pipework will be insulated.

12. SI units shall be used throughout the design. Pipe diameters may be referred to in inches and pressures may be referred to in pounds per square inch in accordance with standard industry practice. Calculations involving diameter and pressure will, however, be in SI units for compatibility.

13. Flanges shall be diver mateable of Ring Type Joint (RTJ) design where diver tie-ins are used.

14. Material selection for the flanges and fittings shall be appropriate to the service conditions to which the equipment is subjected. For carbon steel flanges and fittings all ring grooves, seal surfaces and bore shall be over-laid/clad with Alloy 625.

15. All design, fabrication, installation, hook-up, and pre-commissioning activities shall be subject to properly conducted safety procedures such as Safety Reviews, Safety Programmes, SIMOPS and HAZOP analyses, taking the Safety of the Alvheim, Storklakken and Vilje facilities into account, before Construction Procedures are finalised and implemented.

16. All flexible concrete mattresses are to be 300mm thick and have tapered edges/sides. Non-tapered mattresses may be used, provided that said mattresses are protected for over-trawling or by other means. Concrete mattresses covering spools within 10m radius from the structures are to be covered with 150mm thick mattresses.

17. For the design of rigid spools located between the manifold and XMT(s), the typical inputs of flow, pressure, temperature, spool properties, flange data, mattress loading and tie-in / installation tolerances should be taken into account for operational load cases.

18. When crossing a pipeline, appropriate crossing design shall be made. As a minimum, separation shall be ensured by use of 300mm thick concrete mattresses.

19. During normal operation, spools will not be subject to vibrations and / or lateral movement beyond that defined for the operational load cases. The workover operation loading is detailed in Table 9. The loads given are based on Transocean Winner

Environment	ROA	Max. Rotation[1)]	Vertical Displacement[2)]	Max Displacement[3)]	
[-]	[deg]	[b] [deg]	[mm]	[ft]	[mm]
Normal Operating (Beaufort 9)	0	0.59	26.28	0.137	41.76

Notes

1) Maximum rotation at Subsea tree centerline.

2) Vertical displacement at the tie-in flange location due to rotation. VD=Sin(β)*2555 mm.

3) Maximum lateral displacement.

Table 9: Workover Operation Loading - Subsea Tree Movement

4.2 Operational philosophy

1. Operating pressure and temperature regimes shall be designed to be outside wax and hydrate formation conditions during normal and turndown operation.

2. Choking will be provided subsea on the Storklakken phase 5 XT for bulk flow control.

3. Subsea facilities are to be designed to inject chemicals during all operations (e.g. start-up shutdown and normal production).

4. For long term shutdown, where the planned/unplanned shutdown extends beyond the no touch time for the flowline, blow down of the flowline will be necessary to avoid hydrate blockage.

5. For short-term shutdown it may not be necessary to inject hydrate inhibitor (e.g. methanol) at restart.

6. For a cold, un-dosed start-up, the flowline pressure will be maintained at a low level until conditions allow an increase in pressure. Injection of hydrate inhibitor (e.g. methanol / MEG) and (possibly) wax inhibitor will be required until the flowline is operating normally.

7. Consider how to take care of a potensial leak detection requirement. Leak detection comprises having organizational procedures in place as well as applying monitoring technologies. The monitoring technology may be based on detection subsea, topside or both. The organizational and technical aspects should all be described in a plan for remote measurement.

4.3 Subsea equipment protection philosophy

1. Subsea equipment shall be protected against damage caused by dropped objects. Subsea equipment outside the safety zone around FPSO shall be protected against damage caused by bottom towed fishing equipment accidentally impacting or snagging with the equipment.

2. As per NORSOK impact loads from dropped objects shall be treated as a PLS condition. The impact force from actual objects that will be handled over the structure should be used as initial design loads. Alternatively the following loads may be used:

Group	Impact energy	Impact area	Object diameter
	[kJ]		[mm]
Multi well structures	50	Point load	700

(Manifold, production / gas lift)	5	Point load	100
Other structures	20	Point load	500
	5	Point load	100

Table 10: Drop object impact energy levels (NORSOK)

3. The XMTs will have (integrated or external) protection structures to protect the tree and control equipment from dropped objects.

4. Tie-in spools and jumpers shall be protected from dropped objects by use of GRP covers and/or concrete mattresses as required. Spools and jumpers shall be protected from the weight of concrete mattresses as required.

5. The design and verification of the protection arrangement and any other protection shall be performed.

6. All other items (XMT/OTS) are to be designed for dropped object protection and overtrawlability.

7. All covers shall impose no load on flanges and spools etc. (typically GRP covers are used at 'goose necks' (e.g. tie-in points at the manifolds and XMTs).

8. Tapered concrete mattresses shall be used where required. The tapered ends of the concrete mattresses may be overlapped to ensure that adequate protection is provided. All concrete mattresses are to be 30 cm thick and have tapered edges/sides. 15 cm thick mattresses may be used in areas where the spools are highly stressed so as to reduce the down force on the spools.

9. The hydraulic and electrical jumpers shall not be rockdumped due to the possibility of damage caused by impact from falling rocks and the weight of the rocks lying on top which could crush the hoses.

10. Concrete mattresses used for the purposes of dropped object protection of the hydraulic and electrical jumpers shall not be placed directly on top of the jumpers, in order to prevent any transfer of load from the mattress to the jumper which could crush the hoses.

4.4 Intervention philosophy

1. The XMT subsea control module, MPFM, DIU CITV and shall be designed for ROV retrieval in case of a need for repair or replacement. Divers can also be used to retreive / replace these components.
1. .

2. Choke valve insert on the XMTs shall be retrievable using ROV or diver.

3. Design shall allow ROV access for inspection and maintenance purposes.

4. All ROV valves shall have an API-17H interface or ISO 13628-8 interface as appropriate.

5. Vilje is a ROV operated system any deviation from this needs to agreed in the Vilje licence

4.5 Pigging Philosophy

The main pipeline shall be piggable for any future inspections, although no operational pigging is required unless flow assurance requires this. The gas lift line need to be piggable for dewatering purposed.

There are no requirements for the Storklakken spools to be piggable. However, pending on the chosen concept they may be required to maintain the Vilje piggable requirement.

4.6 Drill Rig Interface

1. Seabed layouts and operations at the wellhead location shall be compatible with the mooring requirements of a semi-submersible, or jack-up drilling rig.

2. The field layout shall be developed to allow the well to be reached by a semisubmersible drilling rig operating on a typical heading of 315° with an eight-anchor configuration using chains. A rig anchor chain length of 1500m with an additional 200m (in direction of pull) safety margin shall be used for the purposes of defining the drill site layout.

3. The well placement/location shall be such that need for shutdown of adjacent wells and equipment is minimised or eliminated (during heavy lift and drilling phase).

4. The target windows for the top-hole locations are a radius of 1m from the planned location.

4.7 Live system

All existing facilities will be in operation. Shut down times during tie-in operations are to be minimised.

4.8 Alvheim FPSO interface

It is a requirement that the field layout minimises the impact that the construction activities have on the Alvheim FPSO.

4.9 Routing philosophy

1. In developing the routing and layout of the flowlines and umbilical, the Contractor shall ensure that the flowlines and umbilical are not routed closer than two hundred meters to any existing suspended well without the specific agreement of Company.

2. Flowlines and umbilicals shall not generally be laid closer than fifty (50) metres from each other or fifty (50) metres to any existing flowline, cable, umbilical or structure except within the approach to the FPSO or well site locations. Separation should then be

progressively reduced over the final six hundred meters to a minimum of not less than ten metres and provided always that adequate real-time monitoring of actual clearances to be conducted to ensure that the integrity of existing facilities is not compromised.

3. Where it is proposed that flowlines or the umbilical are to be laid parallel to existing lay corridors, Contractor is required to make every effort to ensure that the resulting increase in the overall corridor width is minimised.

4. Pipeline routing at the wellhead locations shall take cognisance of the mooring requirements of a semi-submersible drilling rig.

5. Contractor shall finalize pipeline routes based upon the results of the detail design phase of the Work. The final routes of the pipelines shall be agreed with Company. Pipeline routing shall allow access for maintenance/inspection using a DSV or survey vessel.

4.10 Crossings

The crossing configuration shall be designed to maintain a minimum clearance of 300mm between the crossing systems. The determination of separation clearance shall allow for potential local settlement. Contractor shall perform preliminary surveys necessary to design and install pipeline crossings. The complete length of the crossing shall be rock dumped to a minimum cover height of 0.6m above top of pipe.

4.11 Coordinate System

The Geodetic datum for the Work shall be European Datum 1950 (ED 50). Grid co-ordinates shall be expressed as metres in the Universal Transverse Mercator (UTM) projection, zone 31, Central Meridian three degrees (3°) East projected onto Hayford 1924 International Spheroid. Datum transformation from WGS84 will conform to the Geodetiske Publikasjoner Nr 1990:1 for areas South of 62ºN. EPSG transformation 01613 is acceptable.

4.12 Spool Pieces and Tie-ins

All tie-ins may utilize diver mateable flange connections. Tie-ins may be by rigid flanged spool pieces. Expansion forces should be taken into consideration in rigid spool design. The respective field joints and bends will be coated with a suitable polypropylene (PP) coating system. Production bends will comprise of molded insulation system.

4.13 Isolation philosophy

Tie-in flanges shall be provided with sufficient facilities upstream to positively prove the absence of trapped pressure, as required by safe diving practice.

4.14 Corrosion allowance

For corrosion allowance calculations, a value of 1.00 mole % CO_2 in the gas shall be used as this represents our highest conceivable value given possible splits between fields. In addition a sensitivity check peak of 2.00 mole % should be taken into account.

In accordance with NORSOK M-001, the corrosion allowance shall be determined by the below equation,

$$CA = \sum_{i=1}^{n} \left[\frac{A}{100} \cdot CR_{in} + \frac{100 - A}{100} \cdot CR_{u} \right]_{i}$$

where A is the corrosion inhibitor availability, CR_{in} is the inhibited corrosion rate as discussed above, CR_u is the uninhibited corrosion rate. A reference is made to Section 5.6.2.

If the full design life is considered, by adding further production through the same pipeline after Storklakken (2028 - 2034), the total estimated corrosion will be 4.5 mm for respectively 90 % corrosion inhibitor availability.

5 Design Data

5.1 Design Life

The minimum design life for the system is 20 years. Piping Data

Piping materials shall be in accordance to NORSOK M-630, see below table. Tables below are showing typical sizes and materials. A change in pipe sizes and material properties are possible during the study if beneficial for the project.

Property	Size [inch]					
	12	10	6	4	3	2
Piping OD [mm]	323.9	273.1	168.3	114.3	88.9	60.3
Nominal Wall thickness [mm]	14.3	12.7	11	8.56	7.6	8.71
WT tolerance [%]	-12.5% / +15%				-12.5% / +18%	-12.5% / +20%
Method of manufacture	SAWL		SMLS			
Corr. Allowance [mm]	3	3	3	3	3	3

Table 11: Piping Data Typical Sizes

Component Type	Code	Grade	Supplementary Requirements
Duplex SMLS Piping	ASTM A790	S31803/ S32205	MDS D41
Duplex SAWL Piping	ASTM A928	S31803/ S32205	MDS D42
Duplex Bends	ASTM A182/ ASTM A815	F51/ S31803	MDS D44/ MDS D43
Duplex Tee`s	ASTM A182/ ASTM A815	F51/ S31803	MDS D44/ MDS D43
Duplex Transitions	ASTM A182/ ASTM A815	F51/ S31803	MDS D44/ MDS D43
Duplex Weldolets	ASTM A182/ ASTM A815	F51	MDS D44/ MDS D43
Duplex Flanges	ASTM A182	F51	MDS D44
Carbon Steel Flanges (including extended necks)	ASTM A694	F60	MDS C32

Table 12: Typical Piping Material

5.2 Structural Steel Data

Structural materials shall be in accordance to NORSOK M-120, see below table: Tables below are showing typical materials. A change in material properties are possible during the study if beneficial for the project.

Steel Quality Level	Plate	Sections	Tubular
I	Y20 (through thickness properties)	NA	NA
II	Y25	Y26	Y27 (Seamless)
II			Y28 (Welded)
III	Y05	Y05	Y06 (Hot finished)
III			Y07 (Hot finished)
III			Y08 (Cold formed)
IV	Y02 (with impact testing at -20°C and 27/23J acceptance criteria)	Y02 (with impact testing at -20°C and 27/23J acceptance criteria)	NA

Table 13: Typical Steel Material Data

The below table explain the NORSOK correlation between design classes and steel quality level.

Design Class	Joint Complexity	Consequences of Failure	Steel Quality Level			
			I	II	III	IV
DC 1	High	Applicable for joints and members where failure will have substantial consequences and the structure possesses residual strength	x			
DC 2	Low		(x)	x		
DC 3	High	Applicable for joints and members where failure will be without substantial consequences due to residual strength.	(x)	x		
DC 4	Low		(x)		x	
DC 5	Any	No Substantial consequences				x

Table 14: Typical Steel Material Data

Where and how to se of the design classes is explained in table below

Structural Components	Design Class	Inspection Category
Lifting Points	DC 1	See NORSOK N-004 & relevant structural drawings
Members connected to lifting points	DC 2	
Members remote from lifting points	DC 3	
All other elements	DC 4	

Table 15: Structural Design Classes

5.3 Valve Data

The valve shall meet the requirements of ISO 10423 (API 6A), PSL3 or PSL3G as appropriate. In context of ISO 10423 (API 6A), the valves shall comply with the production level PSL3, with PSL3G for low and high-pressure gas tests only, and performance requirement PR2.

The pressure containment design of the body shall be based on ASME “Boiler and Pressure Vessel Code, Section VIII, Division 2”.

All valves shall have an ROV interface. The interface with ROV tooling shall be according to ISO 13628 – 8 (API 17H). The class of bucket will be according to ISO 13628 – 8, such that ROV intervention does not damage the valve.

Hydraulic actuator design shall be designed in accordance with ISO 13628 part 4 (API 17 D) and meet the requirement of ISO 10423/ISO13628 (API6A/API17D) PR2. The hydraulic actuators shall in general meet the requirements of ISO 10423 (API 6A) PSL3

All materials shall comply with the material inspection and test requirements of ISO 10423 (API 6A), section 5 to PSL3.

For all piggable lines, the valves shall be full bore and the ball shall be accurately aligned in the fully open condition. The valve bore shall match the pipeline bore.

Valves with hydraulic actuator that are used to control the flow through the MPFM should have an additional requirement to the PR2 testing to handle a minimum of 1200 cycles.

5.4 Production System General specification and requirements

1. Flow assurance has not been performed for Storklakken tie-back to Alvheim. A flow assurance assessment needs to be performed for the Storklakken development project with recommandations.

2. Minimum and maximum operating pressures and temperatures are specified in Table 16.

3. During unplanned shutdowns, the production system must be sufficiently insulated such that it does not enter the hydrate formation region for a minimum of 8 hours.

4. The production system is to be sufficiently insulated to achieve an arrival temperature higher than the WAT at the FPSO.

5. For more details about the spool materials, see ref. to chapter 5.2.

6. The design of the production system shall allow implementation of the existing Alvheim Kill Well Procedure, ref. /13/.

7. The project assumes sand is not a problem. Sand will not be considered in the design of the subsea facilities. It should be noted that sand screening is included in the down-hole/completion design.

Parameter	Value
Design temperature max [°C]	-30-75
Operating temperature [°C]	48 - 60
Maximum design pressure [bara]	200
Operating pressure [bara]	50 - 68
Gas Lift operation pressure (Start up) [bara] (Note 4)	150
Gas Lift operation pressure (Normal operation) [bara]	140
CO_2 content [mole%] (Note 1)	1.074
Bicarbonate concentration [mg/L] (Note 2)	158
Chloride content [mg/L]	39400
TDS / Salinity [g/L]	65.2
Acetic acid [mg/L] (Note 3)	2
Pipe ID [mm]	247.7
Design life [years]	20

Note 1: *The CO_2 content flashed to standard operating conditions should also be considered.*

Note 2: *The bicarbonate content in (158 mg/L) is the measured composition. The measured bicarbonate content is likely to be lower than the actual in-situ composition due to loss to the atmosphere during sample handling.*

Note 3: *The total content of organic acids is 3 - 5 mg/L*

Note 4: *Supply pressure from Alvheim FPSO can be increased during start up*

Note 5: Values to be verified in next phase

Table 16: Production System - Design Parameters

Minimum design capacities for the base case are detailed in table 4 chapter 3.5

5.4.1 Production profiles

Reference is made to section 3.5.

5.4.2 Production Fluid composition

The fluid composition is presented in the below table:

	Storklakken
Fluid Properties	Mole %
N2	0.146
CO2	1.074
C1	41.555
C2	2.701
C3	2.338
iC4	1.614
nC4	0.803
Neo-C5	0.024
iC5	0.625
nC5	0.466
C6	1.824
C7	4.647
C8	5.282
C9	3.169
C10+	33.732

Table 17: Product fluid composition

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5.5 Gas Lift System General specification and requirements

1. Gas lift is planned supplied from Alvheim through the existing Vilje gas lift system. The gas lift supplied from Alvheim, is assumed to be dry. CO2 corrosion requires free water to occur, and as water is not expected to be present in the gas lift pipeline, no CO2 corrosion of carbon steel will occur.

2. Minimum and maximum operating pressures and temperatures are specified in Table 19.

3. For more details about the spool materials, reference is made to chapter 5.2

4. For operational gas lift pressure refer to table 16./12/

Parameter	Unit	Designation
Design pressure / incidental pressure [1)2)]	[barg]	200 / 220
Min/Max Design temperatures for wellhead spools	[˚C]	-30 / +65

Notes

1. The normal topsides gas lift pressure is 150 barg. It may be as high as 180 barg. Topside PSV setting is 194 barg (+ accumulation of 3%).
2. Pressure to be applied as differential pressure at seabed.

Table 18: Gas Lift System - Design Parameters

5.5.1 Gas Lift Flow parameters

Flow parameters are presented in the below table:

Parameter	Unit	Designation
Design rate	[MMSCFD]	3
Pressure at top of riser / operating pressure	[barg]	155
Operating temperature	[°C]	Ambient

Table 19: Gas lift system - Flow parameters

5.5.2 Gas Lift Fluid composition

Component	Mol [%]
N_2	0.850
CO_2	0.608
C_1	84.50
C_2	7.06
C_3	3.71
i-C_4	1.21
n-C_4	1.12
i-C_5	0.376
n-C_5	0.292
C_6	0.1377
C_7	0.0814
H_2S	0.44 ppm
Water	1.20 ppm

Table 20: Gas composition

Note: The figures are based on the day average from 25.03.2014 as measured topside (Alvheim FPSO).

5.6 Control Umbilical and Control System General Specification and Requirements

5.6.1 Subsea Controls General Requirements

1. The control system selected for deployment into the Storklakken development is to be equipment from the incumbent SPS equipment supplier.

2. The development shall utilise the current configuration in as far as it follows the accepted implementation across the Alvheim field i.e. controls shall be mounted on the tree with the metering being deployed on the manifold.

3. The control system elements shall be as the Alvheim/Vilje design in its form, interface and implementation. Layout and configuration shall be in accordance with operational location.

4. The existing controls system shall be upgraded as required to be able to provide power and communication the Storklakken XMT.

5.6.2 Chemical General Requirements

For relevant MSDS, reference is made to Appendix I

1. The chemical products required subsea for operation of the Storklakken development will be provided via the existing chemical storage and delivery systems available on Alvheim.

2. Supply will be from the existing delivery systems and as such the pressures available for delivery of chemicals to Storklakken will be those of the current system i.e. 328 bar for the speciality products and 197 bar for the methanol (alternatively MEG:Water) system.

   Typical production system flow parameters relevant to chemicals are shown in**Error! Reference source not found.**. MSDS of products (those in use on Alvheim as of November 2011) are shown in Appendix III. These should only be regarded as typical, and products will be subject to change over lifetime of the field. The chemical treat rates and relevant properties are listed in Table 22.

Chemical Product	Product name	Max treatment rate [ppm, v/v]	Max product flow rate [litres /hr]	Product viscosity [cp @4 ˚C]
70:MEG/30:Water	70% MEG	Batch	4000	15
Wax Inhibitor	PI-7194	300 ppm based on oil rate	43.8	8
Corrosion Inhibitor	KI-3993	50 ppm based on water rate	3.8	70
Demulsifier	Emulsotron CC3295-G	30 ppm based on total fluid rate	6.6	<75mPas@20°C
Scale Inhibitor	SI-4134	50 ppm based on water rate	3.8	55

Table 21: Chemical injection rates (properties)

5.6.3 Wax Inhibition

1. Facilities will not be designed for continuous wax inhibition and regular pigging. However, design shall allow for wax inhibition when required, i.e. when fluids arrival temperature is below the minimum wax appearance temperature.

2. Under normal flowing conditions, temperatures in the subsea facilities will be designed to maintain the fluids arrival temperature above the minimum wax appearance temperature

3. Wax inhibitor will only normally be required to be applied at start up or under conditions of low flow.

5.6.4 Corrosion Inhibitor

Corrosion Inhibition will be required to protect the carbon steel production flowline against CO_2 based corrosion and to limit corrosion rates to <0.1 mm/yr. Facilities will be required to deliver corrosion inhibitor injected in to the production flowline close to the manifold.

Work is currently on-going to enable corrosion inhibitor injection via the scale down hole injection system (will apply to all wells connected to Alvheim FPSO).

5.6.5 Demulsifier

Treatment of produced fluids in the flowline with demulsifier is not expected to be required under normal operating conditions. However, if required to assist in achieving the required separation efficiency, provision to inject demulsifier to the flowline at the manifold is to be provided.

5.6.6 Scale Inhibitor

Based on the expected composition of the produced water and the operating conditions, scaling tendency in the production tubing and in the flowline are expected to be low. However owing to uncertainty about the actual composition and the conditions (temperature in particular) that will be experienced; provision is to be made to inject scale inhibitor downhole to each production well.

Facilities are to be provided to deliver the total required scale inhibitor to the Storklakken field.

5.6.7 Hydrate Prevention

1. Under normal flowing conditions, fluids in the subsea facilities will be designed to be outside of the hydrate formation region. Therefore, continuous hydrate inhibition will not be required.
2. On a start up from cold condition hydrate inhibitor will be required to be injected upstream of the production choke to prevent hydrate formation and to prevent excessive subcooling due to Joule Thomson effect.
3. The chemical injection facilities are required to be able to deliver a thermodynamic inhibitor. The hydrate inhibitor currently available for this duty on Alvheim is 70:MEG /30:water, although, the system was originally designed for methanol. Facilities should be designed to be capable of reverting to use of methanol if required.

6 Environmental, seabed geotechnical and geophysical data

It has been assumed that the seabed conditions at Storklakken are similar to the Vilje area / Viking formation. All values given underneath are referring to the Vilje Sør Design Basis dok number 3036-S-TKP-U-FD-18-0004-00.

6.1 Seawater Properties

A seawater density of 1027 kg/m3 will be used throughout the design. The mean salinity is in the range 34.0 - 35.3‰ for all water depths.

The following seabed temperatures to be considered:

- Minimum Seabed temperature: +4°C
- Mean Seabed temperature: +7.7°C
- Maximum Seabed temperature: +8.8°C

6.2 Wave And Current Data

6.2.1 Omni-directional design sea state

Annual probability of exceedance	Significant wave height Hs [m]	Spectral peak period		
		P5	Mean	P95
0.63	10.3	12.1	13.9	15.9
10^{-1}	12.3	13.2	15.0	17.0
10^{-2}	14.2	14.2	16.0	18.1
10^{-4}	17.8	16.0	18.0	20.2

Table 22: Omni-directional design sea state

6.2.2 Design Waves Stoke`s 5th Order Profile

Annual probability of exceedance	Wave Height [m]	Crest Height [m] Stokes V	Wave period		
			P5	Mean	P95
0.63	20.3	11.5	10.9	12.5	14.3
10^{-1}	23.8	13.6	11.9	13.5	15.3
10^{-2}	27.4	15.8	12.8	14.4	16.3
10^{-4}	34.9	20.5	14.4	16.2	18.2

Table 23: Design Wave Stoke`s 5th Order Profile

Direction [°]	Wave height [m]	Spectral peak period		
		P5	Mean	P95
345 – 15	25.1	12.2	13.9	15.6
15 – 45	12.9	8.7	10.7	12.8
45 – 75	12.1	8.5	10.4	12.7
75 – 105	13.5	8.9	10.8	12.9
105 – 135	19.4	10.7	12.4	14.2
135 – 165	23.8	11.9	13.5	15.3
165 – 195	21.5	11.3	12.9	14.7
195 – 225	21.3	11.2	12.9	14.7
225 – 255	22.1	11.5	13.1	14.9
255 – 285	25.1	12.2	13.9	15.7
285 – 315	23.6	11.8	13.5	15.2
315 – 345	26.2	15.5	14.1	15.9
0 – 360	27.4	12.8	14.5	16.3

Table 24: Design Wave height versus direction, return period of 100 years

6.2.3 Current Data

Data from current measurements at the Storklakken Field are not available. The extreme currents at the Storklakken Field are assumed to be similar to (or slightly lower than) the extreme currents at the Sleipner Field due to Dooley current which affects the Sleipner Field (but not the Storklakken Field) in the winter.

Depth [m]	Sector Prob. [%]	Weibull Parameters			Annual Probability of exceedance		
		Shape [-]	Scale [m/s]	Location [m/s]	0.63 [m/s]	10^{-1} [m/s]	10^{-2} [m/s]
10	100.00	1.896	0.2217	0.0201	0.8	0.88	0.96
20	100.00	1.95	0.2222	0.0143	0.77	0.85	0.92
30	100.00	2.022	0.2142	0	0.7	0.77	0.83
40	100.00	2.12	0.2009	0	0.62	0.68	0.73
60	100.00	2.146	0.1982	0	0.6	0.66	0.71
80	100.00	2.22	0.1865	0	0.55	0.6	0.64
3 m ASB	100.00	2.023	0.1549	0	0.5	0.55	0.60

Table 25: Weibull Parameters

7 Abandonment and removal

When the Storklakken facilities are to be abandoned, if not reused at another field, the subsea facilities shall be made safe and disposed of, or removed in accordance with applicable rules and regulations at time of abandonment.

Removal of structures, including protective structure shall be handled as follows:

- The well(s) shall be permanently plugged and abandoned in a safe manner.

This must be taken into account in the design.

Appendix 1
MSDS

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SAFETY DATA SHEET
EPT-2864

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name EPT-2864

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Demulsifier.

1.3. Details of the supplier of the safety data sheet

Supplier
Schlumberger Norge AS
Risabergveien 3
4056 Tananger
Norway
+47 5157 7424

Contact Person MISDS@slb.com

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

National Emergency Telephone Number

Giftinformasjonen (24 hours): +47 22 59 13 00

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and Chemical Hazards	Not classified.
Human health	Eye Irrit. 2 - H319
Environment	Not classified.

Classification (1999/45/EEC) Xi;R36.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

2.2. Label elements

Contains 2-(2-BUTOXYETHOXY)ETHANOL

Label In Accordance With (EC) No. 1272/2008

Signal Word Warning

Hazard Statements

H319	Causes serious eye irritation.

Precautionary Statements

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P264	Wash contaminated skin thoroughly after handling.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P313	Get medical advice/attention.
P501	Dispose of contents/container in accordance with local regulations.

2.3. Other hazards

This product does not contain any PBT or vPvB substances.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

2-(2-BUTOXYETHOXY)ETHANOL		**60-100%**
CAS-No.: 112-34-5	**EC No.: 203-961-6**	**Registration Number: 01-2119475104-44-xxxx**

Classification (EC 1272/2008)	Classification (67/548/EEC)
Eye Irrit. 2 - H319	Xi;R36

Modified Alkoxylate	**1-5%**

Classification (EC 1272/2008)	Classification (67/548/EEC)
Eye Irrit. 2 - H319	Xi;R36.

Solvent naphtha (petroleum), heavy arom.		**1-5%**
CAS-No.: 64742-94-5	**EC No.: 265-198-5**	

Classification (EC 1272/2008)	Classification (67/548/EEC)
EUH066	Xn;R65.
STOT SE 3 - H336	N;R51/53.
Asp. Tox. 1 - H304	R66,R67.
Aquatic Chronic 2 - H411	

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments

The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion

Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention immediately. Continue to rinse.

4.2. Most important symptoms and effects, both acute and delayed

General information

The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For more information on symptoms and effects, see section 11.

4.3. Indication of any immediate medical attention and special treatment needed

Treat Symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media

Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products

Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours.

Unusual Fire & Explosion Hazards

No unusual fire or explosion hazards noted.

5.3. Advice for firefighters

Special Fire Fighting Procedures

Containers close to fire should be removed immediately or cooled with water.

Protective equipment for fire-fighters

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses.

6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Observe good chemical hygiene practices. Avoid spilling, skin and eye contact. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level.

7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place. Avoid excessive heat for prolonged periods of time. Avoid contact with oxidising agents. Bases.

Storage Class

Chemical storage.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Name	STD	TWA - 8 Hrs		STEL - 15 Min		Notes
2-(2-BUTOXYETHOXY)ETHANOL	AN	10 ppm	68 mg/m3			

AN = Administrative normer.

2-(2-BUTOXYETHOXY)ETHANOL (CAS: 112-34-5)

DNEL			
Inhalation.	Short Term	Local Effects	101.2 mg/m³
Dermal	Long Term	Systemic Effects	20 mg/kg
Inhalation.	Long Term	Systemic Effects	67.5 mg/m³
Inhalation.	Long Term	Local Effects	67.5 mg/m³

PNEC	
Freshwater	1 mg/L
Marinewater	0.1 mg/L
Intermittent release	3.9 mg/L
STP	200 mg/L
Sediment (Freshwater)	4 mg/kg
Sediment (Marinewater)	0.4 mg/kg
Soil	0.4 mg/kg

8.2. Exposure controls

Protective equipment

Process conditions

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures

Provide adequate general and local exhaust ventilation. Observe occupational exposure limits and minimize the risk of inhalation of vapours.

Respiratory equipment

In case of inadequate ventilation or risk of inhalation of vapours, use suitable respiratory equipment with combination filter (type A2/P3). At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Hand protection

Use suitable protective gloves if risk of skin contact. Nitrile gloves are recommended, but be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Eye protection

Wear splash-proof eye goggles to prevent any possibility of eye contact.

Other Protection

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

Hygiene measures

Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash hands after handling. Use appropriate skin cream to prevent drying of skin. Promptly remove any clothing that becomes wet or contaminated.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear liquid.
Colour	Brown.
Solubility	Oil Soluble. Part soluble in water.
Relative density	0.985 ± 0.030 20°C
Viscosity	91 cP 20°C
Flash point (°C)	> 80°C

9.2. Other information

Pour Point (°C)	<-20°C

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

No specific reactivity hazards associated with this product.

10.2. Chemical stability

Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Not known.

10.4. Conditions to avoid

Avoid excessive heat for prolonged periods of time.

10.5. Incompatible materials

Materials To Avoid

Avoid contact with oxidising agents. Bases.

10.6. Hazardous decomposition products

Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Inhalation

Gas or vapour may irritate respiratory system.

Ingestion

May cause stomach pain or vomiting.

Skin contact

Prolonged and frequent contact may cause redness and irritation.

Eye contact

Causes serious eye irritation. Spray and vapour in the eyes may cause irritation and smarting.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

12.1. Toxicity

Acute Fish Toxicity

Not considered toxic to fish.

12.2. Persistence and degradability

Degradability

The product is expected to be biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential

The product does not contain any substances expected to be bioaccumulating.

12.4. Mobility in soil

Mobility:

The product is partly miscible with water and may spread in the aquatic environment.

12.5. Results of PBT and vPvB assessment

This product does not contain any PBT or vPvB substances.

12.6. Other adverse effects

Not known.

SECTION 13: DISPOSAL CONSIDERATIONS

General information

Waste to be treated as controlled waste. Disposal to licensed waste disposal site in accordance with local Waste Disposal Authority.

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class

The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04. Waste number: 7152. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

General — The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

14.1. UN number

Not applicable.

14.2. UN proper shipping name

Not applicable.

14.3. Transport hazard class(es)

Not applicable.

14.4. Packing group

Not applicable.

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant

No.

14.6. Special precautions for user

Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable. Please contact MISDS@slb.com for info regarding transport in Bulk.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Legislation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

15.2. Chemical Safety Assessment

International Chemical Inventories

Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements: Europe (EINECS / ELINCS),

SECTION 16: OTHER INFORMATION

Information Sources

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments

The following sections have been revised: 9, 16.

Issued By — Sandra McWilliam

Revision Date — 15-01-2014

Revision	2
Supersedes date	25-06-2013
SDS No.	16153
Safety Data Sheet Status	Approved.
Date	15-01-2014
Signature	Sandra McWilliam
Signature 2	Niolca Anderson

Risk Phrases In Full

R65	Harmful: may cause lung damage if swallowed.
R36	Irritating to eyes.
R66	Repeated exposure may cause skin dryness or cracking.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R67	Vapours may cause drowsiness and dizziness.

Hazard Statements In Full

H319	Causes serious eye irritation.
H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
EUH066	Repeated exposure may cause skin dryness or cracking.
H411	Toxic to aquatic life with long lasting effects.

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SAFETY DATA SHEET
KI-3993

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name KI-3993

Declaration No KI-3993: 303211

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Corrosion inhibitor.

1.3. Details of the supplier of the safety data sheet

Supplier

Schlumberger Norge AS
Division: M-I SWACO
P.O. Box 403
N-4067 Stavanger
Norge
+47 51 57 73 00
Giftinfo. (24hour): +47 22 59 13 00
SDS@miswaco.slb.com

Contact Person Ingrid Helland, telephone: +47 51 57 74 24.

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (1999/45/EEC) Xi;R36/37/38. N;R50/53.

2.2. Label elements

Contains 2-(2-BUTOXYETHOXY)ETHANOL

Fatty acid amine condensate, acetates

Labelling

Irritant

Dangerous for the environment

Risk Phrases

R36/37/38	Irritating to eyes, respiratory system and skin.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases

S24/25	Avoid contact with skin and eyes.
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37	Wear suitable gloves.
S51	Use only in well-ventilated areas.
S57	Use appropriate containment to avoid environmental contamination.
S60	This material and its container must be disposed of as hazardous waste.
S61	Avoid release to the environment. Refer to special instructions/safety data sheets.
P14	Contains 2-Mercaptoethanol. May produce an allergic reaction.

2.3. Other hazards

This product does not contain any PBT or vPvB substances.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

2-(2-BUTOXYETHOXY)ETHANOL		**30-60%**
CAS-No.: 112-34-5	**EC No.: 203-961-6**	
Classification (EC 1272/2008) Eye Irrit. 2 - H319	Classification (67/548/EEC) Xi;R36	

Fatty acid amine condensate, acetates		**30-60%**
CAS-No.: 68153-60-6	**EC No.: 268-887-9**	
Classification (EC 1272/2008) Skin Irrit. 2 - H315 Eye Irrit. 2 - H319 STOT SE 3 - H335 Aquatic Acute 1 - H400	Classification (67/548/EEC) Xi;R36/37/38. N;R50.	

2-Mercaptoethanol		**<1%**
CAS-No.: 60-24-2	**EC No.: 200-464-6**	
Classification (EC 1272/2008) Acute Tox. 3 - H301 Acute Tox. 3 - H311 Acute Tox. 2 - H330 Skin Irrit. 2 - H315 Eye Dam. 1 - H318 Skin Sens. 1 - H317 Aquatic Acute 1 - H400 Aquatic Chronic 1 - H410	Classification (67/548/EEC) T;R23/24/25. Xi;R38,R41. N;R50/53. R43.	

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments

The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion

Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General information

The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For more information on symptoms and effects, see section 11.

4.3. Indication of any immediate medical attention and special treatment needed

Treat Symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media

Water spray, foam, dry powder or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products

Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO_2). Ammonia or amines.

5.3. Advice for firefighters

Special Fire Fighting Procedures

Containers close to fire should be removed immediately or cooled with water.

Protective equipment for fire-fighters

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses. Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.

6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Avoid spilling, skin and eye contact. Avoid inhalation of vapours and spray mists.

7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place. Avoid contact with oxidising agents.

Storage Class

Chemical storage.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Name	STD	TWA - 8 Hrs		STEL - 15 Min		Notes
2-(2-BUTOXYETHOXY)ETHANOL	AN	10 ppm	68 mg/m3			

AN = Administrative normer.

2-(2-BUTOXYETHOXY)ETHANOL (CAS: 112-34-5)

DNEL			
Inhalation.	Short Term	Local Effects	101.2 mg/m³
Dermal	Long Term	Systemic Effects	20 mg/kg
Inhalation.	Long Term	Systemic Effects	67.5 mg/m³
Inhalation.	Long Term	Local Effects	67.5 mg/m³

PNEC	
Freshwater	1 mg/L
Marinewater	0.1 mg/L
Intermittent release	3.9 mg/L
STP	200 mg/L
Sediment (Freshwater)	4 mg/kg
Sediment (Marinewater)	0.4 mg/kg
Soil	0.4 mg/kg

8.2. Exposure controls

Protective equipment

Engineering measures

Provide adequate general and local exhaust ventilation.

Respiratory equipment

In case of inadequate ventilation use suitable respirator. Wear respiratory protection with combination filter: ABEKP. At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Hand protection

Use protective gloves made of: Nitrile. Neoprene. Polyvinyl chloride (PVC). Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Eye protection

Wear approved safety goggles.

Other Protection

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

Hygiene measures

Wash hands at the end of each work shift and before eating, smoking and using the toilet. Use appropriate skin cream to prevent drying of skin. Promptly remove non-impervious clothing that becomes wet or contaminated. Wash contaminated clothing before reuse.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear liquid.
Colour	Brown.
Solubility	Soluble in water.
Melting point (°C)	< -20°C
Relative density	1.02 (20°C)
pH-Value, Diluted Solution	4.2 (10%)
Viscosity	65 (5°C) - 26 (20°C) cps
Flash point	> 80°C CC (Closed cup).

9.2. Other information

No information required.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

No specific reactivity hazards associated with this product.

10.2. Chemical stability

Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Not determined.

10.4. Conditions to avoid

Avoid excessive heat for prolonged periods of time.

10.5. Incompatible materials

Materials To Avoid

Avoid contact with oxidising agents.

10.6. Hazardous decomposition products

None under normal conditions. Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO2). Ammonia or amines.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Inhalation

Irritating to respiratory system.

Ingestion

May cause discomfort if swallowed. May cause stomach pain or vomiting.

Skin contact

Irritating to skin.

Eye contact

Irritating to eyes. Spray and vapour in the eyes may cause irritation and smarting.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

12.1. Toxicity

Acute Fish Toxicity

Very toxic to aquatic organisms.

LC 50, 96 Hrs, Fish mg/l < 1 mg/l

12.2. Persistence and degradability

Degradability

The product is moderately biodegradable. > 20% - < 60 % biodegradation The product contains persistent (not readily degradable) substances.

12.3. Bioaccumulative potential

Bioaccumulative potential

The product is not bioaccumulating.

12.4. Mobility in soil

Mobility:

The product is soluble in water.

12.5. Results of PBT and vPvB assessment

This product does not contain any PBT or vPvB substances.

12.6. Other adverse effects

No information required.

SECTION 13: DISPOSAL CONSIDERATIONS

General information

Waste to be treated as controlled waste. Disposal to licensed waste disposal site in accordance with local Waste Disposal Authority.

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class

The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04. 7152. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

General

14.1. UN number

UN No. (ADR/RID/ADN)	3082
UN No. (IMDG)	3082
UN No. (ICAO)	3082

14.2. UN proper shipping name

Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(Fatty acid amine condensate, acetates)

14.3. Transport hazard class(es)

ADR/RID/ADN Class	9
ADR/RID/ADN Class	Class 9: Miscellaneous dangerous substances and articles.
IMDG Class	9
ICAO Class/Division	9

Transport Labels

14.4. Packing group

ADR/RID/ADN Packing group	III
IMDG Packing group	III
ICAO Packing group	III

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant

14.6. Special precautions for user

EMS	F-A, S-F
Emergency Action Code	•3Z
Hazard No. (ADR)	90
Tunnel Restriction Code	(E)

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Please contact SDS@miswaco.slb.com for information regarding transport in bulk.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Legislation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

15.2. Chemical Safety Assessment

International Chemical Inventories

European Union REACH - All components comply with REACH regulations. Contact REACH@miswaco.com if further information is required. Complies with the following national/regional chemical inventory requirements: Canada (DSL / NDSL), China (IECSC), Europe (EINECS / ELINCS), United States (TSCA).

SECTION 16: OTHER INFORMATION

Information Sources

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments

Classification updated. Revised by Nina B. Øvrehus

Issued By	Bente K. Sando
Revision Date	13.03.2012
Revision	8
Supersedes date	27.02.2012
Safety Data Sheet Status	Approved.
Date	27.08.2008
Signature	Bente K. Sandoe
Signature 2	Nina B. Øvrehus

Risk Phrases In Full

R36/37/38	Irritating to eyes, respiratory system and skin.
R36	Irritating to eyes.
R38	Irritating to skin.
R43	May cause sensitisation by skin contact.
R41	Risk of serious damage to eyes.
R23/24/25	Toxic by inhalation, in contact with skin and if swallowed.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R50	Very toxic to aquatic organisms.

Hazard Statements In Full

H301	Toxic if swallowed.
H311	Toxic in contact with skin.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

A Schlumberger Company

SAFETY DATA SHEET
MEG 70%

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name MEG 70%

Declaration No MEG 70%: 76387

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Commodity.

1.3. Details of the supplier of the safety data sheet

Supplier

Schlumberger Norge AS
Division: M-I SWACO
P.O. Box 403
N-4067 Stavanger
Norge
+47 51 57 73 00
Giftinfo. (24hour): +47 22 59 13 00
SDS@miswaco.slb.com

Contact Person Ingrid Helland, telephone: +47 51 57 74 24.

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA 001 281 561 1600.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and Chemical Hazards	Not classified.
Human health	Acute Tox. 4 - H302
Environment	Not classified.

Classification (1999/45/EEC) Xn;R22.

2.2. Label elements

Contains ETHANEDIOL

Label In Accordance With (EC) No. 1272/2008

Signal Word Warning

Hazard Statements

H302	Harmful if swallowed.

Precautionary Statements

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P501A	Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed of as a hazardous waste.

Supplementary Precautionary Statements

P270	Do not eat, drink or smoke when using this product.

P301+312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P330	Rinse mouth.

2.3. Other hazards

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

ETHANEDIOL		70%
CAS-No.: 107-21-1	EC No.: 203-473-3	
Classification (EC 1272/2008) Acute Tox. 4 - H302	Classification (67/548/EEC) Xn;R22	

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments

The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion

DO NOT INDUCE VOMITING! Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

Inhalation.

Irritation of nose, throat and airway.

Ingestion

Harmful if swallowed.

Skin contact

Prolonged contact may cause redness, irritation and dry skin.

Eye contact

May cause temporary eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed

None known. Get medical advice/attention if you feel unwell.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media

Small fires: Dry powder extinguisher. Larger fires: Water spray. Foam. Water fog.

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products

During fire, toxic gases (CO, CO2) are formed.

5.3. Advice for firefighters

Special Fire Fighting Procedures

Containers close to fire should be removed immediately or cooled with water.

Protective equipment for fire-figthers

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses.

6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Avoid spilling, skin and eye contact. For personal protection, see section 8.

7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a well-ventilated place. Avoid contact with oxidising agents.

Storage Class

Chemical storage.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Name	STD	TWA - 8 Hrs		STEL - 15 Min		Notes
ETHANEDIOL	AN		10 mg/m3	25 ppm		H, T

AN = Administrative normer.
H = Skin absorption.
T = Max value.

8.2. Exposure controls

Protective equipment

Engineering measures

Provide adequate general and local exhaust ventilation.

Respiratory equipment

No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists. Use: Chemical respirator with organic vapour cartridge (Brown A). At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Hand protection

For prolonged or repeated skin contact use suitable protective gloves. Neoprene, nitrile, polyethylene or PVC. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Eye protection

Wear approved safety goggles.

Other Protection

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

Hygiene measures

Wash at the end of each work shift and before eating, smoking and using the toilet. Promptly remove non-impervious clothing that becomes contaminated. Wash promptly with soap & water if skin becomes contaminated.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Liquid
Colour	Colourless.
Odour	Mild.
Initial boiling point and boiling range	116°C
Melting point (°C)	-51°C
Relative density	1, 05 g/ml 25 °C
Flash point (°C)	> 100 °C
Flammability Limit - Lower(%)	3.20
Flammability Limit - Upper(%)	15.30
Partition Coefficient (N-Octanol/Water)	< 0

9.2. Other information

No information required.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

No specific reactivity hazards associated with this product.

10.2. Chemical stability

Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Not determined.

10.4. Conditions to avoid

Avoid contact with oxidising agents.

10.5. Incompatible materials

Materials To Avoid

Not determined.

10.6. Hazardous decomposition products

During fire, toxic gases (CO, CO2) are formed.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Toxic Dose 1 - LD 50 MEG: 4000 mg/kg (oral rat)

Inhalation

Gas or vapour in high concentrations may irritate respiratory system.

Ingestion

Harmful if swallowed. May irritate and cause stomach pain, vomiting and diarrhoea.

Skin contact

May be absorbed through the skin. Prolonged and frequent contact may cause redness and irritation.

Eye contact

Spray and vapour in the eyes may cause irritation and smarting.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

OSPAR have defined this chemical as PLONOR.

12.1. Toxicity

Acute Fish Toxicity

Not considered toxic to fish.

12.2. Persistence and degradability

Degradability

Readily biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential

Will not bio-accumulate.

Partition Coefficient < 0

12.4. Mobility in soil

Mobility:

The product is soluble in water.

12.5. Results of PBT and vPvB assessment

This product does not contain any PBT or vPvB substances.

12.6. Other adverse effects

No information required.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class

The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04. Waste number: 7152. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

General The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

14.1. UN number

14.2. UN proper shipping name

14.3. Transport hazard class(es)

14.4. Packing group

14.5. Environmental hazards

14.6. Special precautions for user

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Legislation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

15.2. Chemical Safety Assessment

International Chemical Inventories

European Union REACH - All components comply with REACH regulations. Contact REACH@miswaco.com if further information is required. Complies with the following national/regional chemical inventory requirements: Europe (EINECS / ELINCS), Australia (AICS), Canada (DSL / NDSL), China (IECSC), Japan (METI / ENCS), Korea (TCCL / ECL), New Zealand (NZIoC), Phillipines (PICCS), United States (TSCA).

Product Registration (Pr.No.) MEG 70%: Norway PRN 76387

SECTION 16: OTHER INFORMATION

Information Sources

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments

Updated according to CLP. Revised by Nina B. Øvrehus

Issued By Bente K. Sando

Revision Date 10.10.2011

Revision 3

Supersedes date	02.02.2011
Safety Data Sheet Status	Approved.
Date	12.01.2001
Signature	Bente K. Sandø
Signature 2	Nina B. Øvrehus

Risk Phrases In Full

R22	Harmful if swallowed.

Hazard Statements In Full

H302	Harmful if swallowed.

Produktinformasjon

Kjemikaliets navn
Oceanic HW443 ND
CAS-nr.


Helseskadelig

Firmanavn
MacDermid Offshore Solutions
R-setninger og S-setninger
R22 Farlig ved svelging.

S36/39 Bruk egnede verneklær og vernebriller/ansiktsskjerm.
S46 Ved svelging, kontakt lege omgående og vis denne beholderen eller etiketten. S60 Dette kjemikaliet og dets emballasje skal behandles som farlig avfall.
Type
16 punkters Sikkerhetsdatablad
Publisert av
MacDermid Offshore Solutions

Iboende egenskaper: (Helse)	**Lav risiko**		
Lokasjoner	**H**	**Status**	**Mengde**
Deck			

Kommentarer til øvrige lokasjoner

Ingen kommentarer tilgjengelig.

Sammendrag risikovurdering

Risikovurdering til lokasjon: Alvheim - Marine - Deck

Modell	Standard risikovurdering					
Vekting (1 - 5)	Helse:	3	Brann:	1	Miljø:	2

SIKKERHETSDATABLAD
Oceanic HW443 ND

Seksjon 1: Identifikasjon av stoffet / blandingen og av selskapet / foretaket

Utgitt dato	26.03.2009
Revisjonsdato	01.10.2013

1.1. Produktidentifikasjon

Kjemikaliets navn	Oceanic HW443 ND

1.2. Relevant identifiserte bruksområder for stoffet eller blandingen og bruk det frarådes mot

Kjemikaliets bruksområde	Hydraulikkvæske for produksjonskontroll innen offshore olje- og gass industri.

1.3. Nærmere opplysninger om leverandøren av sikkerhetsdatabladet

Etterfølgende bruker

Firmanavn	MacDermid Offshore Solutions
Postadresse	Cale Lane, New Springs, Wigan, Lancashire, UK
Postnr.	WN2 1JR
Poststed	Wigan
Land	UK
Telefon	+44 1942 501000
Telefaks	+44 1942 501110
E-post	offshore@macdermid.com
Hjemmeside	http://www.macdermid.com/offshore

1.4. Nødtelefon

Nødtelefon	Giftinformasjonen:22 59 13 00

Seksjon 2: Fareidentifikasjon

2.1. Klassifisering av stoff eller blanding

Klassifisering i henhold til 67/548/EEC eller 1999/45/EC	Xn; R22
Stoffets/blandingens farlige egenskaper	Farlig ved svelging.

2.2. Etikettinformasjon

Faresymbol

Helseskadelig

R-setninger	R22 Farlig ved svelging.
S-setninger	S36/39 Bruk egnede verneklær og vernebriller/ansiktsskjerm. S46 Ved svelging, kontakt lege omgående og vis denne beholderen eller etiketten. S60 Dette kjemikaliet og dets emballasje skal behandles som farlig avfall.
Sammensetning på merkeetiketten	1,2-Etandiol:35 - 45 %

2.3 Andre farer

PBT / vPvB	PBT-/vPvB-vurdering ikke utført.
Farebeskrivelse	Livstruende forgiftning eller nyreskade kan bli følgen dersom innholdet drikkes.
Helseeffekt	1,2-Etandiol kan opptas gjennom huden.

Seksjon 3: Sammensetning / opplysning om innholdsstoffer

3.2. Blandinger

Komponentnavn	Identifikasjon	Klassifisering	Innhold
1,2-Etandiol	CAS-nr.: 107-21-1 EC-nr.: 203-473-3 Indeksnr.: 603-027-00-1	Xn; R22 Acute tox. 4; H302	35 - 45 %
2-(dimetylamino)-2-metylpropan-1-ol	CAS-nr.: 7005-47-2 EC-nr.: 230-279-6	Xn; R22, R36/38	1 - 2 %
Beskrivelse av blandingen	Vann/glykol væske med additiver.		
Komponentkommentarer	Se seksjon 16 for forklaring av R- og H-setninger.		

Seksjon 4: Førstehjelpstiltak

4.1. Beskrivelse av førstehjelpstiltak

Generelt	Nødtelefon: se seksjon 1.4. Ved bevisstløshet eller alvorlige tilfeller, ring 113.
Innånding	Den skadde flyttes straks fra eksponeringskilden. Frisk luft, ro og varme. Kontakt lege hvis ikke alt ubehag gir seg.
Hudkontakt	Fjern tilsølt tøy. Vask straks huden med såpe og vann. Kontakt lege hvis ikke alt ubehag gir seg.
Øyekontakt	Skyll straks med rikelige mengder vann eller øyeskyllevann i inntil 10 minutter. Fjern evt. kontaktlinser og åpne øyet godt opp. Ved lengre tids skylling, anvend lunkent vann for å unngå skade på øyet. Kontakt lege hvis ikke alt ubehag gir seg.
Svelging	Skyll munnen grundig og gi rikelige mengder melk eller vann forutsatt at den skadde ikke er bevisstløs. Fremkall ikke brekninger. Ved brekninger må hodet holdes så lavt at mageinnholdet ikke kommer ned i lungene. Kontakt lege øyeblikkelig! Transport til sykehus. Ta med sikkerhetsdatablad.

4.2. Viktigste symptomer og effekter, både akutt og forsinket

Informasjon til helsepersonell	Kjemikaliet inneholder etylenglykol (1,2-etandiol).
Akutte symptomer og virkninger	Ved svelging av etylenglykol (1,2-etandiol) så absorberes stoffet gjennom fordøyelseskanalen og rammer sentralnervesystemet. Symptomer som eufori, nerveforstyrrelser, magesmerter, brekninger og redusert bevissthetsnivå kan ofte opptre innen 30 minutter. Kjemikaliet kan irritere huden og kan forårsake kløe, svie og rødhet. Kan irritere øynene og kan forårsake rødhet og svie.
Forsinkede symptomer og virkninger	Kan forårsake skader på lever og nyrer.

4.3. Informasjon om umiddelbar legehjelp og spesiell behandling som eventuelt er nødvendig

Annen informasjon	Symptomatisk behandling.

Seksjon 5: Tiltak ved brannslukning

5.1. Brannslukningsmidler

Passende brannslukningsmidler	Pulver, karbondioksid (CO2), vanntåke, skum.
Uegnete brannslukningsmidler	Bruk ikke samlet vannstråle.

5.2. Spesielle farer som stoffet eller blandingen kan medføre

Brann- og eksplosjonsfarer	Kjemikaliet er ikke klassifisert som brannfarlig.
Farlige forbrenningsprodukter	Kan inkludere, men er ikke begrenset til: Karbonmonoksid (CO).

	Karbondioksid (CO_2).

5.3. Anvisninger for brannmannskaper

Personlig verneutstyr	Bruk trykkluftmaske når kjemikaliet er involvert i brann. Ved rømning brukes godkjent rømningsmaske. Se forøvrig seksjon 8.
Annen informasjon	Beholdere i nærheten av brann flyttes straks eller kjøles med vann.

Seksjon 6: Tiltak ved utilsiktet utslipp

6.1. Personlige forholdsregler, verneutstyr og nødprosedyrer

Sikkerhetstiltak for å beskytte personell	Sørg for tilstrekkelig ventilasjon. Benytt personlig verneutstyr som angitt i seksjon 8.

6.2. Sikkerhetstiltak for å beskytte ytre miljø

Sikkerhetstiltak for å beskytte ytre miljø	Forhindre utslipp til kloakk, vassdrag eller grunn.

6.3. Metoder for opprydding og rengjøring

Metoder for opprydding og rengjøring	Små mengder søl: Vask forurenset område med vann. Større mengder: Absorber i vermikulitt, tørr sand eller jord og fyll i beholdere. Spill samles opp i egnede beholdere og leveres som farlig avfall (se seksjon 13).

6.4. Referanse til andre seksjoner

Andre anvisninger	Se også seksjon 8 og 13.

Seksjon 7: Håndtering og lagring

7.1. Forholdsregler for sikker håndtering

Håndtering	Sørg for tilstrekkelig ventilasjon. Unngå innånding av damper og kontakt med hud og øyne. Må ikke svelges. Bruk angitt verneutstyr, se seksjon 8.

Beskyttende tiltak

Råd om generell yrkeshygiene	Det må ikke spises, drikkes eller røykes under arbeidet. Vask hendene etter hvert skift, og før spising, røyking eller bruk av toalett. Vask tilsølte klær før de brukes.

7.2. Betingelser for sikker oppbevaring, inklusiv eventuelle uforenligheter

Oppbevaring	Lagres tørt på et godt ventilert sted. Beskytt mot direkte sollys.
Råd angående samlagring	Lagres adskilt fra: Sterke oksidasjonsmidler. Sterke syrer. Sterke baser. Oppbevares adskilt fra næringsmidler.

7.3 Spesifikk bruk

Spesielle bruksområder	Se seksjon 1.2.

Seksjon 8: Eksponeringskontroll / personlig verneutstyr

8.1. Kontrollparametere

Annen informasjon om grenseverdier	Forklaring av anmerkningene nedenfor: H = Hudopptak S = Korttidsverdi er en grenseverdi som ikke skal overskrides når eksponeringen midles over en gitt referanseperiode. Referanseperioden er 15 minutter hvis ikke annen referanseperiode er oppgitt.

Tiltaks- og grenseverdier

Komponentnavn	Identifikasjon	Verdi	Norm år
1,2-etandiol	CAS-nr.: 107-21-1 EC-nr.: 203-473-3	8 t.: 20 ppm 8 t.: 52 mg/m³ H 15 min.: 40 ppm 15 min.: 104 mg/m³	

S

8.2 Begrensning av eksponering på arbeidsplassen

Begrensning av eksponering på arbeidsplassen	Personlig verneutstyr skal være CE-merket og bør velges i samarbeid med leverandøren av slikt utstyr. Det anbefalte verneutstyret og de angitte standardene er veiledende. Standarder skal være av nyeste versjon. Risikovurdering av den aktuelle arbeidsplassen/-operasjonen (faktisk risiko) kan medføre andre vernetiltak. Sørg for tilstrekkelig ventilasjon, inkl. lokal avtrekksventilasjon, for å sikre at fastsatte eksponeringsgrenser ikke overskrides.

Åndedrettsvern

Åndedrettsvern	Ved utilstrekkelig ventilasjon: Bruk egnet åndedrettsvern med gassfilter, type A2.

Håndvern

Håndvern	Benytt hansker av motstandsdyktig materiale.
Referanser til relevante standarder	NS-EN 374.
Egnede materialer	Neoprengummi. Nitrilgummi.
Gjennomtrengningstid	> 8 timer.

Øye- / ansiktsvern

Øyevern	Bruk sprutsikre vernebriller dersom det er mulighet for direkte øyekontakt.
Referanser til relevante standarder	NS-EN 166.

Hudvern

Annet hudvern enn håndvern	Bruk egnede verneklær for å beskytte mot langvarig eller gjentatt hudkontakt.

Passende miljømessig eksponeringskontroll

Begrensing av miljøeksponering	Forhindre utslipp til kloakk, vassdrag eller grunn. Se også seksjon 12.

Annen informasjon

Annen informasjon	Nøddusj og mulighet for øyeskylling bør finnes på arbeidsplassen.

Seksjon 9: Fysiske og kjemiske egenskaper

9.1. Informasjon om grunnleggende fysiske og kjemiske egenskaper

Tilstandsform	Væske.
Farge	Klar til halmfarget.
Lukt	Amin. Mild
Kommentarer, Luktgrense	Ikke kjent.
pH (handelsvare)	Verdi: 9,6 Test temperatur: 20 Enhet: °C
Kommentarer, pH (bruksløsning)	Ikke kjent.
Kommentarer, Smeltepunkt / smeltepunktsintervall	Ikke kjent.
Kokepunkt / kokepunktintervall	Verdi: 100 °C
Flammepunkt	Verdi: > 100 °C Testmetode: Closed Cup
Kommentarer, Fordampningshastighet	Ikke kjent.
Antennelighet (fast stoff, gass)	Ikke relevant.
Kommentarer, Eksplosjonsgrense	Ikke kjent.
Damptrykk	Verdi: 2,33 KN.m-2
Kommentarer, Damptetthet	Ikke kjent.
Relativ tetthet	Verdi: 1,07 Test temperatur: 15,6 °C

Løselighet i vann	Løselig.
Kommentar, Løselighet	Delvis løselig i fett og olje.
Kommentarer, Fordelingskoeffisient: n-oktanol / vann	Ikke kjent.
Kommentarer, Selvantennelighet	Ikke kjent.
Kommentarer, Dekomponeringstemperatur	Ikke kjent.
Viskositet	Verdi: 4 mm²/s Test temperatur: 20 °C

Fysikalske farer

Eksplosive egenskaper	Ikke eksplosjonsfarlig.
Oksiderende egenskaper	Ikke kjent.

9.2 Annen informasjon

Andre fysiske og kjemiske egenskaper

Kommentarer	Ingen ytterligere informasjon er tilgjengelig.

Seksjon 10: Stabilitet og reaktivitet

10.1. Reaktivitet

Reaktivitet	Ingen testresultater tilgjengelig.

10.2. Kjemisk stabilitet

Stabilitet	Stabil under normale temperaturforhold og anbefalt bruk.

10.3. Risiko for farlige reaksjoner

Risiko for farlige reaksjoner	Ingen farlige reaksjoner er kjent.

10.4. Forhold som skal unngås

Forhold som skal unngås	Unngå direkte sollys.

10.5. Materialer som skal unngås

Materialer som skal unngås	Sterke oksidasjonsmidler. Sterke syrer. Sterke baser.

10.6 Farlige spaltningsprodukter

Farlige spaltningsprodukter	Ingen under normale forhold. Se også seksjon 5.2.

Seksjon 11: Toksikologisk informasjon

11.1 Informasjon om toksikologiske effekter

Toksikologisk informasjon

LD50 oral	Verdi: 4,7 mg/kg Forsøksdyreart: Rotte Kommentarer: Gjelder for 1,2-Etandiol (CAS 107-21-1).
LD50 dermal	Verdi: 9530 mg/kg Forsøksdyreart: Kanin Kommentarer: Gjelder for 1,2-Etandiol (CAS 107-21-1).

Potensielle akutte effekter

Innånding	Damp kan irritere svelg og luftveier og forårsake hodepine, svimmelhet og sløvhet. Innånding av høye konsentrasjoner av produktet kan forårsake de samme symptomene som ved svelging.
Hudkontakt	1,2 etandiol kan opptas gjennom huden.
Øyekontakt	Kan virke irriterende og kan fremkalle rødhet og svie.
Svelging	Farlig ved svelging. Kan forårsake beruselse, hodepine, svimmelhet, magesmerter, kramper og i alvorlige tilfeller bevisstløshet, akutt nyresvikt, åndedretts- og hjertestans. Dødelig dose for en voksen person: ca. 50 - 100 ml (etylenglykol). Kjemisk lungebetennelse kan oppstå hvis oppkast av løsemidler kommer i

	lungene.
Irritasjon	Kriteriene for klassifisering er på grunnlag av de tilgjengelige data ikke ansett å være oppfylt.
Etsende	Kriteriene for klassifisering er på grunnlag av de tilgjengelige data ikke ansett å være oppfylt.

Forsinket / Repeterende

Hudkontakt	Langvarig eller gjentatt kontakt avfetter huden og kan forårsake hudirritasjon.
Allergi	Kriteriene for klassifisering er på grunnlag av de tilgjengelige data ikke ansett å være oppfylt.
Gjentatte toksisitet doser	Kriterierne for klassifisering kan på grunnlag av de foreliggende data ikke anses å være oppfylt.
Kroniske effekter	Kan forårsake skader på lever og nyrer.

Kreftfremkallende, mutagene og reproduksjonstoksiske

Kreft	Kriteriene for klassifisering er på grunnlag av de tilgjengelige data ikke ansett å være oppfylt.
Arvestoffskader	Kriteriene for klassifisering er på grunnlag av de tilgjengelige data ikke ansett å være oppfylt.
Reproduksjonsskader	Kriteriene for klassifisering er på grunnlag av de tilgjengelige data ikke ansett å være oppfylt.

Seksjon 12: Miljøopplysninger

12.1. Toksisitet

Økotoksisitet	Kjemikaliet er ikke klassifisert som miljøskadelig.

12.2. Persistens og nedbrytbarhet

Persistens og nedbrytbarhet	Kjemikaliet forventes å være bionedbrytbart.

12.3. Bioakkumulasjonspotensial

Bioakkumulasjonspotensial	Kjemikaliet forventes ikke å bioakkumulere.

12.4. Mobilitet i jord

Mobilitet	Løselig i vann.

12.5. Resultater av PBT og vPvB vurdering

PBT vurderingsresultat	PBT-vurdering ikke utført.
vPvB vurderingsresultat	vPvB-vurdering ikke utført.

12.6. Andre skadevirkninger

Andre skadevirkninger / annen informasjon	Ingen kjente.

Seksjon 13: Fjerning av avfall

13.1. Metoder for avfallsbehandling

Egnede metoder til fjerning av kjemikaliet	Leveres som farlig avfall til godkjent behandler eller innsamler. Koden for avfall (EAL-kode) er veiledende. Bruker må selv angi riktig EAL-kode hvis bruksområdet avviker.
Produktet er klassifisert som farlig avfall	Ja
Avfallskode EAL	EAL: 16 03 05 organisk avfall som inneholder farlige stoffer
NORSAS	7042 Organiske løsemidler uten halogen

Seksjon 14: Transportinformasjon

14.1. UN-nummer

Kommentar	Ikke farlig i forbindelse med transport under UN, IMO, ADR/RID og IATA/ICAO regler.

14.2. UN varenavn

Kommentar	Ikke relevant.

14.3. Transport fareklasse

Kommentar	Ikke relevant.

14.4. Emballasjegruppe

Kommentar	Ikke relevant.

14.5. Miljøfarer

Kommentar	Ikke relevant.

14.6. Spesielle forholdsregler for bruker

Spesielle forholdsregler	Ikke relevant.

14.7. Transport i bulk i henhold til vedlegg II til MARPOL 73/78 og IBC-koden

Forurensning kategori	Ikke relevant.

Seksjon 15: Opplysninger om lover og forskrifter

15.1. Forskrift / regelverk om stoff eller blanding i forhold til sikkerhet, helse og miljø

Referanser (Lover/Forskrifter)	FOR 2002-07-16-1139: Forskrift om klassifisering, merking mv. av farlige kjemikalier med senere endringer. Forskrift om registrering, vurdering, godkjenning og begrensning av kjemikalier (REACH-forskriften) av 30. mai 2008 med senere endringer. Stoff listet i seksjon 3 er sjekket mot Vedlegg VI til CLP-forordningen, (EU) nr. 1272/2008, den til enhver tid gjeldende utgave. FOR 2011-12-06 nr 1358 Forskrift om tiltaks- og grenseverdier. Avfallsforskriften, FOR 2004-06-01 nr 930, fra Miljøverndepartementet. FOR 2009-04-01 nr 384: Forskrift om landtransport av farlig gods med senere endringer, Direktoratet for samfunnssikkerhet og beredskap.
Deklarasjonsnr.	87403

15.2. Vurdering av kjemikaliesikkerhet

Vurdering av kjemikaliesikkerhet er gjennomført	Nei

Seksjon 16: Andre opplysninger

Leverandørens anmerkninger	Informasjonen i dette dokument skal gjøres tilgjengelig for alle som håndterer kjemikaliet.
Liste over relevante R-setninger (i seksjon 2 og 3).	R36/38 Irriterer øynene og huden. R22 Farlig ved svelging.
Liste over relevante H-setninger (i seksjon 2 og 3).	H302 Farlig ved svelging.
Brukte forkortelser og akronymer	EAL-kode: kode fra EUs felles klassifiseringssystem for avfall (EWC = European Waste Code) PBT: Persistent, Bioakkumulerende og Toksisk (giftig) vPvB: veldig Persistent og veldig Bioakkumulerende LD50: Dødelig dose, den dosen som dreper 50% av en populasjon
Viktigste kilder ved utarbeidelsen av Sikkerhetsdatabladet (ikke norske)	Sikkerhetsdatablad fra leverandør datert: 26.02.2013
Opplysninger som er nye, slettet eller revidert	Versjon: 2. Seksjoner endret: 1-16. Tidligere utgitt i annet format.
Kvalitetssikring av informasjonen	Dette sikkerhetsdatabladet er kvalitetssikret av Teknologisk Institutt as, som er sertifisert iht. ISO 9001:2008.
Versjon	2
Ansvarlig for Sikkerhetsdatablad	MacDermid Offshore Solutions

Utarbeidet av Teknologisk Institutt as v/ Tonje D. Rongved

MI SWACO
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SAFETY DATA SHEET
PI-7194

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name PI-7194

Declaration No RS-9943: 303992

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Paraffin Inhibitor.

1.3. Details of the supplier of the safety data sheet

Supplier Schlumberger Norge AS
Risabergveien 3
4056 Tananger
Norway
+47 5157 7424

Contact Person SDS@slb.com

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

National Emergency Telephone Number

Giftinformasjonen (24 hours): +47 22 59 13 00

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and Chemical Hazards	Not classified.
Human health	EUH066;STOT SE 3 - H336;Asp. Tox. 1 - H304
Environment	Aquatic Chronic 2 - H411

Classification (1999/45/EEC) Xn;R65. N;R51/53. R66, R67.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

2.2. Label elements

Contains Hydrocarbons, C10, aromatics, <1% naphthalene

Label In Accordance With (EC) No. 1272/2008

Signal Word Danger

Hazard Statements

H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
H411	Toxic to aquatic life with long lasting effects.

Precautionary Statements

P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.

P301+330+331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P304+340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310	Immediately call a POISON CENTER or doctor/physician.
P501	Dispose of contents/container in accordance with local regulations.

Supplementary Precautionary Statements

P261	Avoid breathing vapour/spray.
P391	Collect spillage.
P403+233	Store in a well-ventilated place. Keep container tightly closed.

Supplemental label information

EUH066	Repeated exposure may cause skin dryness or cracking.

2.3. Other hazards

This product does not contain any PBT or vPvB substances. Static electricity and formation of sparks must be prevented.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

Hydrocarbons, C10, aromatics, <1% naphthalene **60-100%**

EC No.: 918-811-1 **Registration Number: 01-2119463583-34-XXXX**

Classification (EC 1272/2008)	Classification (67/548/EEC)
STOT SE 3 - H336	Xn;R65.
Asp. Tox. 1 - H304	N;R51/53.
Aquatic Chronic 2 - H411	R66,R67.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Ingredient notes

Substances which have an EC Number that begins with the number "9" is a Provisional List Number. The list numbers published by ECHA do not have any legal significance. The EC substance definition and related classification & labelling has been developed in the framework of the Regulation (EC) No 1907/2006 (REACH). For information about the related CAS number see section 15 of this SDS.

Composition Comments

The data shown is in accordance with the latest EC Directives. The product contains other ingredients which does not contribute to the overall classification.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation

Provide rest, warmth and fresh air. In case of persistent throat irritation or coughing: Seek medical attention and bring these instructions. Place unconscious person on the side in the recovery position and ensure breathing can take place. If respiratory problems, artificial respiration/oxygen.

Ingestion

DO NOT INDUCE VOMITING! Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Never give liquid to an unconscious person. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention immediately. Continue to rinse.

4.2. Most important symptoms and effects, both acute and delayed

General information

The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For more information on symptoms and effects, see section 11.

4.3. Indication of any immediate medical attention and special treatment needed

Treat Symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media

Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products

Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO2).

Unusual Fire & Explosion Hazards

Vapours are heavier than air and may spread near ground to sources of ignition. Solvent vapours may form explosive mixtures with air.

Specific hazards

Combustible.

5.3. Advice for firefighters

Special Fire Fighting Procedures

Containers close to fire should be removed immediately or cooled with water. Keep run-off water out of sewers and water sources. Dike for water control.

Protective equipment for fire-fighters

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions

Do not allow ANY environmental contamination. Do not allow to enter drains, sewers or watercourses. Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.

6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Observe good chemical hygiene practices. Avoid spilling, skin and eye contact. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level.

7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Keep away from heat, sparks and open flame. Avoid contact with oxidising agents.

Storage Class

Chemical storage.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Ingredient Comments

Oil mist (mineral) workplace exposure limits are currently under review by legislative authorities. This workplace exposure limit (WEL) standard is applicable to highly refined mineral oils and is provided as a guidance limit only LT. EXP = 5mg/m3 and ST. EXP = 10mg/m3.

Hydrocarbons, C10, aromatics, <1% naphthalene (CAS: 64742-94-5)

DNEL				
Professional	Dermal	Long Term	Systemic Effects	12.5 mg/kg/day
Professional	Inhalation.	Long Term	Systemic Effects	150 mg/m3
Consumer	Dermal	Long Term	Systemic Effects	7.5 mg/kg/day
Consumer	Inhalation.	Long Term	Systemic Effects	32 mg/m3
Consumer	Oral	Long Term	Systemic Effects	7.5 mg/kg/day

8.2. Exposure controls

Protective equipment

Process conditions

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures

Provide adequate general and local exhaust ventilation.

Respiratory equipment

Use respiratory equipment with combination filter, type A2/P3. At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Hand protection

Use protective gloves. Nitrile gloves are recommended. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Eye protection

Wear approved safety goggles.

Other Protection

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

Hygiene measures

Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash promptly if skin becomes wet or contaminated. Promptly remove any clothing that becomes wet or contaminated.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear liquid.
Colour	Yellowish
Odour	Pungent.
Solubility	Oil Soluble. Insoluble in water
Vapour density (air=1)	>1 (101 kPa)
Viscosity	8 cP @ 4°C
Flash point (°C)	>61°C CC (Closed cup).

9.2. Other information

Pour Point (°C)	<-2°C
Density	0.886 ± 0.030 g/ml (20°C)

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

No specific reactivity hazards associated with this product.

10.2. Chemical stability

Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Not known.

10.4. Conditions to avoid

Avoid heat, flames and other sources of ignition. Take precautionary measures against static discharges.

10.5. Incompatible materials

Materials To Avoid

Avoid contact with oxidising agents.

10.6. Hazardous decomposition products

Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO2).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Aspiration hazard:

Viscosity

May be fatal if swallowed and enters airways. Solvent. Kinematic viscosity <= 20.5 mm2/s.

Aspiration can be a hazard if this material is swallowed.

General information

Prolonged and repeated contact with solvents over a long period may lead to permanent health problems.

Inhalation

Vapours may cause drowsiness and dizziness. Contains organic solvents which in case of overexposure may depress the central nervous system causing dizziness and intoxication.

Ingestion

May be fatal if swallowed and enters airways. Danger of aspiration and development of chemical pneumonia.

Skin contact

Repeated exposure may cause skin dryness or cracking.

Eye contact

Spray and vapour in the eyes may cause irritation and smarting.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Toxic to aquatic life with long lasting effects.

12.1. Toxicity

LC 50, 96 Hrs, Fish mg/l	< 5 mg/l*
EC 50, 48 Hrs, Daphnia, mg/l	< 10 mg/l*
IC 50, 72 Hrs, Algae, mg/l	> 10 mg/l*

*Based on components

12.2. Persistence and degradability

Degradability

The product is moderately biodegradable. > 20% - < 60 % biodegradation

12.3. Bioaccumulative potential

Bioaccumulative potential

The product does not contain any substances expected to be bioaccumulating.

12.4. Mobility in soil

Mobility:

The product is insoluble in water and will spread on the water surface. The product contains volatile organic compounds (VOC) which will evaporate easily from all surfaces.

12.5. Results of PBT and vPvB assessment

This product does not contain any PBT or vPvB substances.

12.6. Other adverse effects

Not known.

SECTION 13: DISPOSAL CONSIDERATIONS

General information

Waste to be treated as controlled waste. Disposal to licensed waste disposal site in accordance with local Waste Disposal Authority.

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class

The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04.
Waste number: 7152. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

14.1. UN number

UN No. (ADR/RID/ADN)	3082
UN No. (IMDG)	3082
UN No. (ICAO)	3082

14.2. UN proper shipping name

Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Hydrocarbons, C10, aromatics, <1% naphthalene)

14.3. Transport hazard class(es)

ADR/RID/ADN Class	9
ADR/RID/ADN Class	Class 9: Miscellaneous dangerous substances and articles.
IMDG Class	9
ICAO Class/Division	9

Transport Labels

14.4. Packing group

ADR/RID/ADN Packing group	III
IMDG Packing group	III
ICAO Packing group	III

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant

14.6. Special precautions for user

EMS	F-A, S-F

Emergency Action Code	•3Z
Hazard No. (ADR)	90
Tunnel Restriction Code	(E)

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Please contact SDS@slb.com for info regarding transport in bulk.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Legislation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.

15.2. Chemical Safety Assessment

International Chemical Inventories

Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements: Europe (EINECS / ELINCS), United States (TSCA). CAS: 64742-94-5 can be used to identify the substance given a list number in section 3 in areas not subject to the REACH regulation.

SECTION 16: OTHER INFORMATION

Information Sources

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments

The following sections have been revised: 9, 11

Issued By	Sandra McWilliam
Revision Date	11-12-2013
Revision	2
Supersedes date	30-09-2013
Safety Data Sheet Status	Approved.
Date	11-12-2013
Signature	Sandra McWilliam
Signature 2	Nicola Anderson

Risk Phrases In Full

R65	Harmful: may cause lung damage if swallowed.
R66	Repeated exposure may cause skin dryness or cracking.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R67	Vapours may cause drowsiness and dizziness.

Hazard Statements In Full

H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
EUH066	Repeated exposure may cause skin dryness or cracking.
H411	Toxic to aquatic life with long lasting effects.

A Schlumberger Company

SAFETY DATA SHEET
SI-4133

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name SI-4133

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Scale inhibitor.

1.3. Details of the supplier of the safety data sheet

Supplier

Schlumberger Norge AS
Division: M-I SWACO
P.O. Box 403
N-4067 Stavanger
Norge
+47 51 57 73 00
Giftinfo. (24hour): +47 22 59 13 00
SDS@miswaco.slb.com

Contact Person Ingrid Helland, telephone: +47 51 57 74 24.

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (1999/45/EEC) Xn;R22.

2.2. Label elements

Contains 2,2'-OXYBISETHANOL

Labelling

Harmful

Risk Phrases

R22	Harmful if swallowed.

Safety Phrases

S60	This material and its container must be disposed of as hazardous waste.

2.3. Other hazards

This product does not contain any PBT or vPvB substances.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

2,2'-OXYBISETHANOL		30-60%
CAS-No.: 111-46-6	EC No.: 203-872-2	

Classification (EC 1272/2008)	Classification (67/548/EEC)
Acute Tox. 4 - H302 STOT RE 2 - H373	Xn;R22

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments

The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion

Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General information

The severity of the symptoms described will vary dependant of the concentration and the length of exposure.

4.3. Indication of any immediate medical attention and special treatment needed

Treat Symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media

Use fire-extinguishing media appropriate for surrounding materials.

5.2. Special hazards arising from the substance or mixture

Specific hazards

Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO_2).

5.3. Advice for firefighters

Special Fire Fighting Procedures

Containers close to fire should be removed immediately or cooled with water.

Protective equipment for fire-fighters

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses.

6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

See section 11 for more detailed information on health effects and symptoms.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Avoid spilling, skin and eye contact.

7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place. Avoid contact with strong oxidisers. Strong acids. Strong alkalis. Keep away from heat, sparks and open flame.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

2,2'-OXYBISETHANOL (CAS: 111-46-6)

DNEL				
Industry	Dermal	Long Term	Systemic Effects	106 mg/kg/day
Industry	Inhalation.	Long Term	Local Effects	60 mg/m3
PNEC				
Freshwater	10	mg/l		
Marinewater	1	mg/l		
Intermittent release	10	mg/l		
STP	199.5	mg/l		
Sediment (Freshwater)	20.9	mg/kg		
Soil	1.53	mg/kg		

8.2. Exposure controls

Protective equipment

Process conditions

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures

Provide adequate general and local exhaust ventilation.

Respiratory equipment

No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists. Use respiratory equipment with combination filter, type A2/P3. At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Hand protection

For prolonged or repeated skin contact use suitable protective gloves. Neoprene, nitrile, polyethylene or PVC.

Eye protection

Wear approved chemical safety goggles where eye exposure is reasonably probable.

Other Protection

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

Hygiene measures

Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash promptly with soap & water if skin becomes contaminated.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear liquid.
Colour	Brown.
Odour	No characteristic odour.

Solubility	Soluble in water.
Melting point (°C)	< -20°C
pH-Value, Diluted Solution	8, 1 (10%)
Viscosity	32 cP 20 °C
Flash point	> 80°C

9.2. Other information

Density	1, 171 g/ml (20°C)

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None under normal conditions.

10.2. Chemical stability

Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Not known.

10.4. Conditions to avoid

Keep away from heat, sparks and open flame.

10.5. Incompatible materials

Materials To Avoid

Strong oxidising substances.

10.6. Hazardous decomposition products

Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO2).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Toxicological information

Toxicological data for major component(s):

Acute toxicity:

Acute Toxicity (Oral LD50)

~ 12.500 mg/kg Rat

Acute Toxicity (Dermal LD50)

~ 13.300 mg/kg Rabbit

Acute Toxicity (Inhalation LC50)

> 4.6 mg/l (dust/mist) Rat 4 hours

Inhalation

Not relevant at normal room temperatures. When heated, irritating vapours may be formed.

Ingestion

Harmful if swallowed. May cause liver and/or renal damage. May irritate and cause stomach pain, vomiting and diarrhoea.

Skin contact

Irritating and may cause redness and pain. May be absorbed through the skin.

Eye contact

Spray and vapour in the eyes may cause irritation and smarting.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

12.1. Toxicity

12.2. Persistence and degradability

Degradability

The product is moderately biodegradable. > 20% - < 60 % biodegradation

12.3. Bioaccumulative potential

Bioaccumulative potential

The product is not bioaccumulating.

12.4. Mobility in soil

Mobility:

The product is soluble in water.

12.5. Results of PBT and vPvB assessment

Not Classified as PBT/vPvB by current EU criteria.

12.6. Other adverse effects

Not known.

SECTION 13: DISPOSAL CONSIDERATIONS

General information

Waste is classified as hazardous waste. Disposal to licensed waste disposal site in accordance with the local Waste Disposal Authority.
When handling waste, consideration should be made to the safety precautions applying to handling of the product.

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class

The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04.
Waste number: 7152. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

General — The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

14.1. UN number

Not applicable.

14.2. UN proper shipping name

Not applicable.

14.3. Transport hazard class(es)

Transport Labels

No transport warning sign required.

14.4. Packing group

Not applicable.

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant

No.

14.6. Special precautions for user

Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Please contact SDS@miswaco.slb.com for info regarding transport in bulk.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Legislation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

15.2. Chemical Safety Assessment

International Chemical Inventories

European Union REACH - All components comply with REACH regulations. Contact REACH@miswaco.com if further information is required. Complies with the following national/regional chemical inventory requirements: Australia (AICS), China (IECSC), Europe (EINECS / ELINCS), United States (TSCA).

SECTION 16: OTHER INFORMATION

Information Sources

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments

This is first issue.

Issued By	Nina B. Øvrehus
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Revision	1
Supersedes date	-
Safety Data Sheet Status	Approved.
Date	22.05.2012
Signature	Nina B. Øvrehus

Risk Phrases In Full

R22	Harmful if swallowed.

Hazard Statements In Full

H302	Harmful if swallowed.
H373	May cause damage to organs <<Organs>> through prolonged or repeated exposure.