

**Dahl Oilfield Services as**

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**Dahl Oilfield Services a.s.**

STAVANGER – NORWAY

Org.nr.991442715MVA Foretaksregisteret

Dolphin Drilling A/S  
Vestre Svanholmen 12  
4313 SANDNES

**Leveringsadresse**  
Plattformvegen 5, 4056  
Tananger

Vår ref. Stig Dahl  
Deres ref. Jarl Hovinbøle  
Referanse 450011880BRGL

Side 1  
Fakturanr.  
Ordrenr. 19791  
Kundenr. 30182  
Prosjekt 19791  
Avdeling  
Leveringsform By Truck  
Lev.betingelser Mottaker betaler frakt  
Leveringsdato 09.03.2021  
Valuta NOK  
KID  
Fakturadato  
Bet. betingelser Netto 30 dager  
Ordredato 28.01.2021  
Forfallsdato 27.02.2021

**Pakkseddel**

Produktnr.	Produktbeskrivelse	Lokasjon	Leveringsdato	Bestilt	Tidl. levert	Rest	Leveres
	Vi takker for deres ordre og kan bekrefte levering av følgende produkter:						
	Re. sertifisering / Service av 5 7/8" Od BOP JUMP TOOL NC50						
	Løfte sertifisert for WLL 450 Ton.						
	( S/N: NOS-07-16445 )						
	Følgende er inkludert i re.sertifisering:						
	Ultra spyling 2000Bar, demontering						
	100% NDT.						
	Oppdatering av kontroll kort ( bruksattest for 450ton WLL)						
	Av sak kyndig. / godkjent 3 part.						
	Fosfatisering alle deler.						
	Montering av donut & låse ring.						
	Utarbeidelse dokumentasjons pakke.						
	Inkl. nye beregninger i.h.t.NORSOK R-002 & ISO 13535.						
	NC50 box kuttes om til DS55 box ( 5 7/8")						
1	Komplett pris		09.03.2021	1,00	0,00	0,00	1,00
	.						
1	Document / Dawing Service		09.03.2021	1,00	0,00	0,00	1,00
	Pris ovenfor er basert på at dodut						
	kan demonteres uten problemer og						
	om noen deler må skiftes blir dette belastet til						
	dok. kost + 10% ( Eller avtalt pris på forhånd)						

DOS Wo No : 19791

Date: 08.03.21

Customer : Dolphin Drilling AS

Po No : 450011880BRGL

## **Certificate of Conformity.**

### **Description / Type of equipment:**

1 Ea BOP jump tool for working load 450 Ton, consisting of:  
1 Ea. 5 7/8"Od, integral type pup joint, length 5 meters.  
1 Ea. Lift nut / Donut  
1 Ea. Lock ring.  
S/N: NOS-07-16445 ( -1, -2 & -3 )

### **Scope of work:**

Equipment was disassembled, high pressure cleaned,  
There was performed visual, dimensional inspection & 100% NDT ( MPI ) on all  
above parts.  
5 7/8" Integral type pup joint was modified from NC50 box to DS55 box.  
All parts assembled again after inspection.

### **Specifications:**

There was issued new DVR ( Design Verification report ) with reference  
To Norsok R-002, API 8C and ISO 13535 and equipment comply to these  
Specifications.

Dahl Oilfield Services a.s.

*Stig Dahl*

-----  
Stig Dahl.



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[illegible]

Ph.-Phosphorizing  
BM- Bench mark  
CW- Cold Work

Signature

22.02.2021

# I. Åsen



**Kunde/Client: DAHL OILFIELD SERVICES AS**

**Sertifikat nr./Certificate no.: RED-233173**

**For prøving og undersøkelse av kjettinger, ringer, kroker, sjakler, svinger, blokker og andre løfteredskaper.**

**For testing and thorough examination of chains, rings, hooks, shackles, swivels, pulley blocks and other lifting accessories.**

Ordrenr/Order No: 7054

**FORM 4**



ID, Kjenningnr. eller merke / Distinguishing number or mark	Beskrivelse av utstyr / Description of gear	Antall / Number	Dato for prøve / Date of test	Prøvelast (tonn) / ProofLoad (tonnes)	WLL (tonn) / WLL (tonnes)
<b>NOS-07-16445-3</b>	<b>BOP Jump Tool DS55 BOX WLL. 450t</b>  Serienr./Serial No/Batch: NOS-07-16445-3 Produsent/Producer: Norse Oilfield Services AS/Dahl Oilfield Services AS Prod. år/year: 2014 Prod. iht./acc. to: NORSOK R002, API 8C, ISO 13535 Antall /Number of : 1 Design temp./Design temp. : 0 to +20°C Material/Material : AISI 4145H Design faktor/Design factor : 3 Lengde/Length : 5000mm NDT test dato/NDT test date : MPI - 25.02.2021  BOP Jump Tool has been load tested to 598,5t & held for a periode of 5 min.  Non destructive examination was performed after load test, and no indications were found.  Note: BOP Jump Tool shall be used in. acc. to manual.  Testet iht./Tested acc. to: NORSOK R002	1	25.02.2021	598,5t	450t Vertical

Ble redskapene undersøkt av en sakkyndig virksomhet etter prøvebelastningen og funnet å ha utholdt belastningen uten deformasjon og å være fri for brudd, brist eller andre feil? / Was the above gear examined by a competent person and found to have withstood the proof load without damage or deformation, and no fraction, cracks etc detected?

Ja/Yes

Navn og adresse til fabrikanten eller forhandleren / Name and address of manufacturer or distributor

Dahl Oilfield Services AS

Navn og adresse på den sakkyndige virksomhet, som utførte prøven og undersøkelsen / Name and address of manufacturer, company, association or distributor that performed the test and examination

Redkon AS  
Org.nr./Entity ID: 818745702  
Plattformveien 6  
4056 TANANGER  
Norway

Den ansvarshavendes navn og stilling i ovennevnte institusjon, sakkyndig virksomhet som utførte prøven og undersøkelsen / Position of signatory that performed test and examination

Øyvind Jacobsen  
Fagleder

Undertegnede attesterer at ovennevnte innretning med tilbehør er prøvebelastet som angitt ovenfor etter bestemmelsene i «Forskrift 1360 Forskrift om administrative ordninger», at prøven ble utført under oppsyn av en sakkyndig virksomhet, at en grundig undersøkelse av innretningen med tilbehør utført av en sakkyndig virksomhet, viste at den hadde utholdt prøven uten å ha fått skade eller permanente formforandringer, og at den tillatte arbeidsbelastningen av innretningen er som angitt over.

The signatory confirms that the above mentioned lifting appliance(s) with accessories was tested in accordance with the regulations given in "Forskrift 1360 Forskrift om administrative ordninger", and that the load test was carried out under supervision of Sakkyndig Virksomhet(authorised company) and found to have withstood the proof load without damage or deformation, and no fraction, cracks etc. detected, and that the safeworking for the lifting appliance / device is as shown above.

10.03.2021

Øyvind Jacobsen, Stavanger, Fagleder



# MAGNETIC PARTICLE TESTING REPORT

CLIENT DAHL OILFIELD SERVICES AS		FABRICATION SITE	
TITLE BOP JUMP TOOL		WORK ORDER NO 7054	
ID NOS-07-16445-3		DATE OF INSPECTION 25.02.2021	
TESTING PROCEDURE 101-1		DRAWING NO 104547 & 104550	
ACCEPTANCE CRITERIA DNVGL-CG-0051			
WELD NUMBER N/A	WELDER N/A	MATERIAL AISI 4145H	DIMENSION THICKNESS Vary
SURFACE CONDITION Clean	WELDING PROCESS N/A	JOINT TYPE N/A	EXTENT OF TESTING Surface
EQUIPMENT Yoke 3876	TYPE OF POWDER MR76F Batch no. 1245A	CURRENT AC	
CONTRAST/COLOUR N/A	FIELD STRENGTH 4,5kg	PROD/POLE SPACING Max 150mm	
MAGNITIZED FOR Both Longitunal & transverse	FLUX FIELD STRENGTH INDICATOR castrol strips	UV LIGHT: Max 20LUX 3000CM2	TEMPERATURE 18°C
SKETCH/TEST RESULT  100% mpi of threads and on critical areas performed after load test. No indications found during inspection. Accepted acc. to spec.			
CUSTOMER	INSPECTOR Stian Eltervaag	TECHNICIAN LEVEL 2 Stian Eltervaag Cert no: 11184-N2-MT	
SIGNED	SIGNED <i>Stian Eltervaag</i>	SIGNED <i>Stian Eltervaag</i>	







DAHL OILFIELD SERVICES AS

**BOP JUMP TOOL  
USER INSTRUCTIONS**



0	NEW ISSUE	2014-11-28	<i>E.J. Wiig</i>
REV	ISSUE	DATE	BY



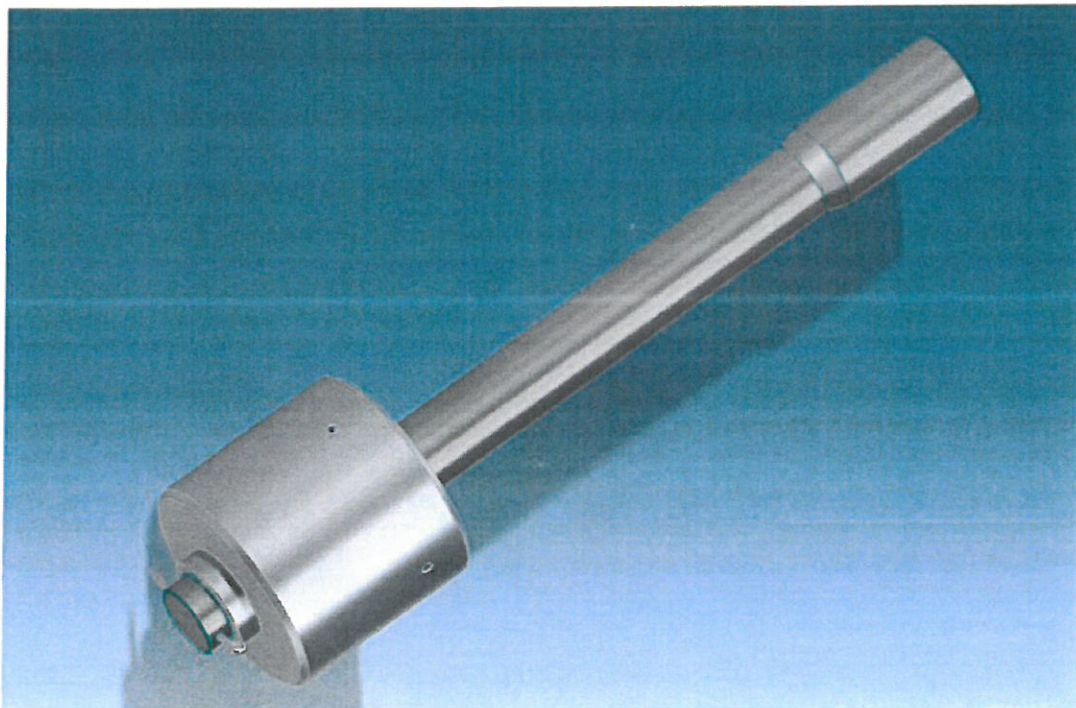
1.	SHORT DESCRIPTION .....	3
2.	INSTALLATION OF DO-NUT .....	3
3.	INSPECTION BEFORE USE .....	4
4.	MAKE UP TO DP .....	4
5.	USE OF THE BOP JUMP TOOL .....	4
6.	MAINTENANCE .....	4
7.	PERIODIC INSPECTION BY ENTERPRISE OF COMPETENCE .....	4
7.1	Yearly inspection; renewal of the certificate for use .....	4
7.2	Four-yearly thorough inspection.....	5

## 1. SHORT DESCRIPTION

The BOP Jump Tool (BJT) comprises the Mandrel, a screwed-on disc, called Do-nut, the Retainer Nut and a Cotter Pin.

The BJT is designed for transferring the BOP between well slots on a subsea template during drilling operations on the various wells.

The BJT is inserted in the BOP, and a ram is closed above the do-nut, to allow lifting of the complete BOP.



## 2. INSTALLATION OF DO-NUT

Normally the Do-nut shall always be installed on the Mandrel.

For the first, and subsequent installations; clean internal and external threads thoroughly, and apply a thin coat of grease on the threads.

With the Do-nut supported by ie. two pieces of wood, giving about 150 mm/6in of clearance below, with the Do-nut mandrel-face facing up, pick up the Mandrel, lower into the do-nut and gently screw the mandrel in, until it bottoms out on the shoulder. Note that hand tight is OK, no specific torque is required. Then, turn the assembly horizontal, and enter the Retainer Nut on the Mandrel, and screw it against the underside of the Do-nut.

Secure with Cotter Pin, and bend out the cotter pin legs to lock it in place.

### 3. INSPECTION BEFORE USE

Before make up to drill pipe, the BJT box end threads shall be cleaned and checked for debris, or any visual damage.

Use dope on threads, as per on board practice.

Visually verify that the Do-nut is screwed on the Mandrel, to touch the upset at the end of the threaded area.

Also check that the Retain Ring is screwed against the bottom of the do-nut, and that the cotter pin is installed and secured.

### 4. MAKE UP TO DP

Make up the BJT to the drill pipe, to predetermined torque, as per onboard procedures

### 5. USE OF THE BOP JUMP TOOL

The BJT is to be used for lifting, transferring and setting down the BOP between subsea well slots.

Before lifting the BOP, ensure that the platform heave is within the limit for this operation; app. 300 mm.

The BJT is run into the BOP and the Do-nut is positioned below the actual ram to be closed.

Then the BOP may be lifted and transferred as per dedicated onboard procedure.

### 6. MAINTENANCE

The user may perform in-use inspections.

In case of any indications of damage, etc; report to owner or enterprise of competence (competent person) for lifting appliances.

#### **Before each use:**

Perform inspections as described in Ch. 3.

#### **After each use perform the following inspections:**

Visual inspection of Do-nut; any dents or scars seen?

Visual inspection of Mandrel; any dents or scars in body (by setting of ram)

#### **After breaked from drill pipe:**

Any abnormal dents or scars in too joint by tong?

Any visible damage to threads in box end?

Insert thread protector in box end?

### 7. PERIODIC INSPECTION BY ENTERPRISE OF COMPETENCE

#### **7.1 Yearly inspection; renewal of the certificate for use**

This inspection may include dismounting of the Do-nut for check of Do-nut and Mandrel threads.

In addition, the tool joint threads may be inspected.

The mandrel shall be inspected for any dents or scars.

Scars up to 3 mm depth and covering an arc of 90 deg, or of maximum 100 mm length, are acceptable, provided that they are spaced at least half length of the longest scar.

Sharp scars may be ground smooth.

Damage of a maximum of 10% of the total thread length for the treads on the Mandrel and Do-nut may be accepted, provided that the damage is sanded smooth and will not cause more damage or chafing to the remaining threads when made up.

#### 7.2 Four-yearly thorough inspection

Four-yearly inspection may include dismounting of the Do-nut for check of Do-nut and Mandrel threads. In addition, the tool joint threads may be inspected.

The same acceptance criteria as for the yearly inspection applies.

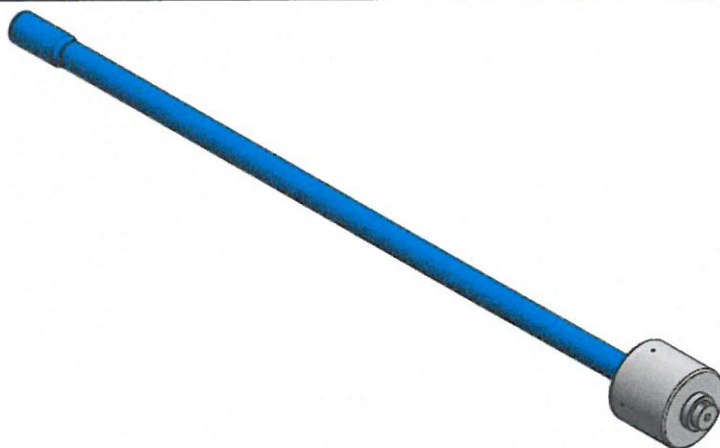
Parts of the mandrel and/or threaded areas may be expected by surface defect inspection methods, as Dye Penetrant or Magnetic Particle Inspection.



## Design Report

### LOOSE LIFTING GEAR IN DRILLING AREA

#### SDLA



BOP JUMP TOOL

Customer:	<b>Dahl Oilfield Service AS</b>
Customer order no:	83062
Project no: / Order no:	7054
Internal doc no:	DVR – 7054
Serial Numbers:	NOS-07-16445-3

Rev. No:	Issue Date:	Reason for Issue:	Prepared:	Checked:	Approved:
00	11.02.2021	Issued for information	G. Olaussen	O. Jacobsen	G.Olaussen

## CONTENTS

1	Introduction.....	2
2	Drawing reference(s):.....	3
3	Design criterias .....	3
3.1	NS-EN ISO 13535 – Drilling and production equipment, Hoisting Equipment.....	4
3.1.1	4.1 General .....	4
3.1.2	4.3.4 Equivalent stress.....	4
3.1.3	4.7 Design safety factor .....	4
3.1.4	4.8 Shear strength .....	4
3.2	NORSOK R-002.....	4
3.2.1	Annex C.....	4
3.2.2	C.17.3.3.....	5
3.2.3	C.17.3.4 Testing .....	5
3.2.4	C.17.3.5 Information for use .....	5
4	Technical description.....	6
4.1	Main data for DC58 Pin Lift Sub .....	6
5	Calculations .....	7
6	Conclusion .....	8

## 1 INTRODUCTION

This report validates the structural strength for a loose lifting gear, used in the drilling area of fixed or floating installations. No considerations towards any potential hazards due to the operational use of the lifting subs are covered in this report. It is assumed that a risk assessment, as described in e.g.

ISO 12100 is performed by the owner to evaluate the suitability and safe use of the lifting subs in their actual environment of use.

For the purpose of this validation, the following assessments have been made:

- Capacity of cross section
- Capacity of the unit's resistance to bending (horizontal lifting/pulling)

The drill thread connections of the lifting subs are of standard type, and they have a higher yield than the lowest cross section of the main bodies. From this, the capacity of the cross section, as well as the bending capacity, will form the basis for the calculations.

Calculation methods applied:

- Manual calculations through excel spreadsheet.

Software	
Manual calculations	Microsoft Office 365 Excel

## 2 DRAWING REFERENCE(S):

104550

10457

The preceding image is taken from Drawing No. NOS 303741 Rev. 2.

**Note: the shank has been reduced from OD 6 5/8" to OD 5 7/8".**

## 3 DESIGN CRITERIAS

This report validates the design of a BOP Jump tool According to API 8C, ISO 13535 & NORSOK R002

Care shall be taken when lifting/raising the sub from horizontal to vertical level. The lifting sub has far less capacity to withstand forces acting on it due to bending, given its slender form.

The calculations generate two possible capacities for the lifting sub. Working load limit (WLL) in bending direction, and WLL in straight vertical pull.

### Assumptions:

It is assumed that no lifting will be performed without the threaded connections being fully engaged.

Applicable Design Codes	National Regulations
NS-EN ISO 13535, Drilling and production equipment, Hoisting equipment	NA
NORSOK R-002 Lifting Equipment	NA
API 8C	NA

### 3.1 NS-EN ISO 13535 – Drilling and production equipment, Hoisting Equipment

#### 3.1.1 4.1 General

Hoisting equipment shall be designed, manufactured and tested so that it is in every respect fit for its intended purpose. The equipment shall safely transfer the load for which it is intended. The equipment shall be designed for simple and safe operation.

#### 3.1.2 4.3.4 Equivalent stress

$$\sigma_{\max} = \frac{YS_{\min}}{SF_D}$$

where

$YS_{\min}$  is the specified minimum yield strength;

$SF_D$  is the design safety factor.

An ultimate strength (plastic) analysis may be performed under any one of the following conditions:

- a) for contact areas;
- b) for areas of highly localized stress concentrations caused by part geometry, and other areas of high stress gradients where the average stress in the section is less than or equal to the maximum allowable stress as defined in 4.3.4.

In such areas, the elastic analysis shall govern for all values of stress below the average stress.

#### 3.1.3 4.7 Design safety factor

The design safety factor shall be established from Table 1 as follows.

Table 1 — Design safety factor

Load rating $R$ kN (ton)	Design safety factor $SF_D$
1 334 kN (150 short tons) and less	3,00
1 334 kN (150 short tons) to 4 448 kN (500 short tons) inclusive	$3,00 - [0,75 \times (R - 1\,334)/3\,114]^a$
Over 4 448 kN (500 short tons)	2,25
<sup>a</sup> In this formula, the value of $R$ shall be in kilonewtons.	

#### 3.1.4 4.8 Shear strength

For purposes of design calculations involving shear, the ratio of yield strength in shear to yield strength in tension shall be 0,58.

### 3.2 NORSOK R-002

#### 3.2.1 Annex C

C.17.1 specifies lifting subs as special designed lifting accessories (SDLA) in drilling area. For general requirements, reference is made to above standard, NS EN ISO 13535.



NOTE: For the purpose of calculating the WLL according to NORSOK R-002, the design load according to ISO 13535 shall be divided by a dynamic coefficient of 1,33

### **3.2.2 C.17.3.3**

Lifting subs shall be secured with double barriers to avoid any part of the tool to disconnect (e.g. unscrew) from the load or the lifting appliance.

NOTE: For screwed connections, a verified torque in accordance with the manufacturer instructions, may be regarded as the second barrier.

“Means shall be provided for the operator to verify that these types of SDLAs with non-threaded connections are correctly connected to the load and the lifting appliance. For SDLAs where the load holding elements interfacing with the profiles of the load are not visible from the outside of the SDLA, indicating devices visible from the outside shall be provided. Indicating devices shall be visible from all sides of the SDLA. The indicating devices shall give a clear and unambiguous indication that the load holding elements are in correct (locked) position and secured. The indicating devices must be designed to prevent indication of “locked and secured” if the SDLA is not locked and secured. All SDLAs shall be provided means for connection of standardized lifting accessories for safe handling the SDLA without load.”

### **3.2.3 C.17.3.4 Testing**

SDLAs shall be proof tested in accordance with Table C.1.

For SDLAs with WLL specified for different directions (e.g. vertical and horizontal), the SDLA shall be proof load tested in each specified direction with a test load corresponding the specified WLL for each direction.

### **3.2.4 C.17.3.5 Information for use**

The working load limit (WLL) of the SDLA must be clearly shown in the user manual. For SDLAs with multiple WLLs, each WLL and its corresponding direction must be explained.

Detailed instruction, including figures/pictures, must be given in the user manual to describe how the SDLA is connected and secured to the lifting appliance and to the load. The interpretation of any indicating devices must be unambiguously described in the user manual.

For SDLAs connected with threads to the load or to the lifting appliance (e.g. Derrick Drilling Machine), the necessary torque to be applied must be specified in the user manual together with any preparation requirements (e.g. lubrication). A clear warning must be provided to inform the user that no lifting is allowed until the specified torque(s) have been applied.

Wear tolerances of load carrying elements for connection to the lifting appliance or to the load must be given in the user manual.

In addition to the user manual, a one-sheet assembly instruction with illustrations and operational limitations shall accompany the SDLA.

## 4 TECHNICAL DESCRIPTION

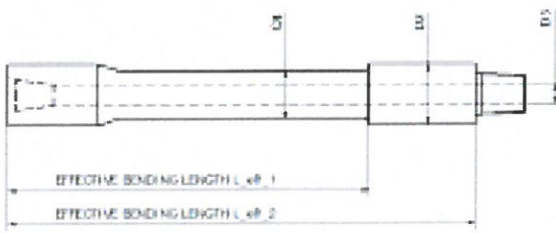
### 4.1 Main data for Jump tool

Group:	R10 (Specially Designed Lifting Accessories)
WLL, vertical	450 Tonnes (metric)
WLL, bending	1,5Tonnes (metric)
Design Safety Factor $SF_D$	3
Design temperature:	-20°C
Material:	AISI 4145H 133Ksi

## 5 CALCULATIONS

As seen in the following spreadsheet, the DS55 Jump tool still satisfy the vertical pull WLL 450T.

**LIFTING SUB SPREAD SHEET - NORSOK R-002**



D1	149,23 mm
D2	132,4 mm
D3	38,1 mm
L_eff_1	4306 mm
L_eff_2	4900 mm

Material yield:	575 N/mm²
Safety factor	3 *
Calculating yield	291,6667 N/mm²

\*Safety factor dependent on the required WLL of lifting sub. Ref table 1 below for correct SF

Cross section area (D1)	16330 mm²
WLL vertical pull	4769 kN
WLL vertical pull	486 Tons(metric)

Wb_1	$\pi/32 * (D1^4 - D3^4/D1)$	324877
Wb_2	$\pi/32 * (D2^4 - D3^4/D2)$	353493
cb_allowable		206 N/mm²

WLL_Bending L_eff_1	15 kN
	1,5 Tons(metric)
WLL_Bending L_eff_2	15 kN
	1,5 Tons(metric)

The spread sheet calculates two possible cross sections in regards to bending. Always apply the lowest calculated WLL to the lifting sub

### DESIGN SAFETY FACTORS TO ISO 13535 / API 8C

Table 1 – Design safety factor

Load rating P kN (tons)	Design safety factor SF <sub>d</sub>
1 334 kN (300 short tons) and less	5,00
1 334 kN (300 short tons) to 4 448 kN (1000 short tons) inclusive	$3,00 + (P/75) - (P/1 334) (1/14)^2$
Over 4 448 kN (1000 short tons)	2,75

\* In this formula, the value of P shall be in kilonewtons

### Determination of safety factor assistant

For ratings between 1334-4448 kN ONLY

Load rating: 166 kN  
Design Safety Factor: 4,36

#### C.17.3 Complementary requirements

##### C.17.3.1 Design

For the purpose of calculating the WLL according to this NORSOK standard, the design load according to ISO 13535 shall be divided by a dynamic coefficient of 1,33.

From this, design safety factor as calculated above, shall be multiplied by 1,33 for NORSOK design.

## 6 CONCLUSION

Based on manual calculations performed, the structural capacity of the lifting subs is found to meet requirements for the working load limits specified below:

LIFTING SUB SERIAL NO.	WLL VERTICAL (Metric tons)	WLL BENDING (Metric tons)	
NOS 07-16445-3	450	1,5	

Before being taken into use, the lifting subs shall undergo a proof load test in accordance with table C.1 of NORSOK R-002 Lifting Equipment. Before and after testing, the lifting subs shall undergo a thorough visual inspection and NDT.

The lifting subs shall be marked according to NORSOK R-002 and ISO 13535, and they shall have a detailed user instruction written out. The user instruction shall describe all relevant information regarding handling, installation, and the safe and correct use of the lifting subs.