

NOFO STANDARD

for

OIL RECOVERY VESSELS

2005

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Attachment 1

Drawings_NOFO-std_2005

1 INTRODUCTION

1.1 Requirements

This document specifies the requirements, which vessels included in NOFO's standby fleet must meet. It is also assumed that the vessels satisfy the requirements set by the Norwegian authorities and classification societies.

1.2 Deviation from requirements

NOFO may accept deviations from certain sub-requirements in cases where this is considered not to significantly detract from the suitability of the vessels in ORO (Oil Recovery Operation). All deviations from the requirements must be clarified with NOFO in the design phase.

2 VESSELS

2.1 Collecting tanks

2.1.1 Tank capacity

The tank capacity in ORO shall be able to use the following tanks:

- Mud tanks
- Brine tanks
- Base oil tanks
- Methanol tank
- Special product tanks
- Staff tanks
- Chain boxes
- Fuel tanks

It will only be possible to omit certain tanks if these are clearly unsuitable. This must be clarified with NOFO in the design phase by submitting the tank plan for approval.

The following tanks is not to be included in ORO's tank capacity:

- Wing tanks, bottom tanks and other tanks with an inner structure
- Freshwater tanks
- Tanks with a volume of less than 50 m³

Under no circumstances must the tank capacity for storage of recovered oil be less than 1,000 m³. An active effort must be made to achieve the greatest possible tank capacity.

2.1.2 System for heating recovered oil

All the vessel's ORO tanks must be equipped with a permanent system for heating recovered oil / emulsion. This system must ensure that it is possible to raise the temperature of a volume of 1,000 m³ with 15 °C within 12 hours; calculated for a sea

temperature of 5 °C and air temperature of 0 °C. The heating elements for each tank must be dimensioned so that the whole heating capacity may be used if heating no more than 2 - 3 tanks at the same time.

2.1.3 Access and inspection

It must be possible to access all ORO tanks from the deck via manholes with standard dimension: 600 x 800mm.

All ORO tanks, with the exception of methanol tanks, must be equipped with an ullage hatch to ease inspection and sounding.

2.1.4 Ventilation

As specified in the requirements from the classification authorities, tank ventilation must be permanently installed.

2.2 Loading and discharge systems

2.2.1 Discharge system

The vessel must have a separate (dedicated) pump and pipe system for use in ORO.

Each tank must be equipped with a dedicated discharge pump. The pump can be submerged in the tank or connected to the tank via a short suction tube. The same pump may serve two adjacent tanks. The pump system on the suction side of each tank, must not cause a drop in pressure of more than 0.5 bar when discharging oil with a viscosity of 3000 cSt.

The pipe system must enable circulation of the volume in individual tanks without interrupting loading / discharging of other tanks.

For preparation of the ORO pipe system, all orifices to be closed / opened must be Seut type or a similar approved type of valve.

2.2.2 Discharge capacity

The vessel's discharge system (pumps / pipe system) must satisfy the following total delivery capacity requirements for withdrawal on deck

- *Min 500 m³/hour against 3 bar at 3,000 cSt viscosity and*
- *Min 300 m³/hour against 7 bar at 3,000 cSt viscosity,*

Theoretical calculations, which take pressure loss in the pipe system at deck level into account and are based on the documented capacities of the pumps, shall substantiate the discharge capacity. It shall be possible to achieve the discharge rate when discharging no more than half of the tanks at the same time.

It shall be possible to demonstrate discharge capacity through physical tests.

2.2.3 Choice of pumps

The pumps used must be screw pumps or another type of pump with documented suitability for oils / emulsions. The capacity of each pump must be adequate to meet the total discharge capacity requirement when discharging no more than half of the tanks at the same time. No single pump must have a capacity less than 100 m³.

NPSH must be at least 0.5 bar for pumps that are not submerged in the tanks. All capacity numbers for pumps must be documented up to minimum 3.000 cSt.

2.2.4 Discharge / loading manifold on deck

The loading and discharge pipes to / from the tanks must be connected to a manifold approx. 15 m from the vessel's stern on the starboard side. The manifold must be positioned so that the connected hoses do not have sharp bends and are not exposed to wear against the vessel's other installations.

The manifold and pipe system must allow for loading at the same time as settled seawater is pumped overboard. The vessels must have a pipe system on board to carry settled seawater over the side of the vessel and into the sea on the starboard side.

The connections shall be of type:

- *6" Weco union female coupling, wp 1000/69 psi/bar.*

2.2.5 Valves

It must be possible to switch between the tanks during loading / discharging preferably by using remotely operated valves.

2.2.6 Filter system (drawing no. 009)

The vessel's loading line must be equipped with a double filter system to prevent debris / waste from being pumped into the tanks. The dimensions of the filter must be tailored to the tolerance of the vessel's discharge pumps in order to minimize the chance of damage / shutdown. The filter housing should be equipped with a quick-opening lock to enable quick cleaning of the filter.

2.3 Deck layout (drawing no. 001 – 009)

2.3.1 Transverse rail astern (drawing no. 004)

On vessels that have a transverse rail astern, this must be removable and give an opening with a minimum width of 7.0 m and height of 2.5 m for launching / recovery of oil booms over the stern. The transition between the stern / deck and any remaining rail must be rounded with a minimum radius of 250 mm.

2.3.2 Oil recovery equipment anchoring points

The vessels must have permanent anchoring points for oil recovery equipment. When positioning oil recovery equipment, there must be at least a gap of 400 mm between the vessel's installations and the revolving oil skimmer and booms (refer to drawings 002 and 004). If container anchoring points on the deck are exposed to knocks and external strain, these should be covered when not in use.

2.3.3 Positioning the skimmer

The rail astern on the starboard side, and possible the stern itself must not be of a height or have a cover that obstructs the oil skimmer operator's view. If the rail is higher than 2.5 m, a platform must be built on which the oil skimmer is positioned and can be operated. The platform must be built around the whole of the oil skimmer so that the operator may work with the equipment from all sides. The platform must also be permanently installed. If the platform hampers the regular use of the vessel, a platform that can be lowered or a hinged arrangement, may be accepted.

The platform must be designed with oil spills drainage (for example by using a grating). If the base is higher than 1 m above the main deck, there must be a railing around the platform. The base must be designed and classified in accordance with the forces in action when the oil recovery equipment is operated (ref. drawing nos. 003, 006 and 007)

2.3.4 Stern gate

The stern gate must be hinged, and it must be possible to open, close and secure it hydraulically. Attachment using screw bolts must be avoided.

2.3.5 Mobilization time requirement

The total time for preparing the deck area for receiving the oil recovery equipment on board must not exceed 1 hour. The vessel's crew must be able to carry out this work.

2.4 Towing boom system (drawing no. 001)

The vessel's tugger winch on the starboard side is used for handling the towropes abeam.

The vessel must have an anchoring point on the starboard side, approx. 30 m from the stern for controlling the towrope abeam. The anchoring point must be positioned so that there is no wear on the wire during operation of the towropes.

- *Towrope tension: 15 tonnes*
- *Wire length: 110 m*

2.5 Cabin capacity

The vessel must have at least 10 berths for NOFO's ORO personnel.

3 OIL RECOVERY EQUIPMENT

Operation of NOFO's oil recovery equipment requires the following supply from the vessel:

3.1 Electric power supply

Power supply outlets for the oil recovery equipment must be installed in a cabinet with air tightness class IP 66 or better. The cabinet should be made from rustproof material and be located in the protected area at the rear of the deckhouse. The cabinet must be marked with "NOFO" and must contain the following outlets:

- *3 pcs CEAG outlet 1 - phase 16A/230v Eex-ed (Blue) - GHG 5113306 R 0001*
- *1 pc CEAG outlet 3 - phase 32A/380/415 Eex-ed (Red)- GHG 5124406 R 0001*

3.2 Air for power tools

The air outlet for power tools / equipment must be located in areas where such tools may be used in connection with mobilization / demobilization of oil recovery equipment on board.

3.3 Water supply

The water supply for jet water washing must be located at the rear of the deckhouse. The water supply must have the following capacity and connections:

- *1" claw coupling, European standard*
- *Water capacity: min. 1500 l/hour*

3.4 Hydraulic power (drawing no. 002 and no. 010)

3.4.1 Hydraulic power outlet

Hydraulic power outlets from the vessel's system: 2 pcs. high pressure, 2 pcs. return and 2 pcs. drainage, must be located on the starboard side, approx. 10 m from the vessel's stern post.

3.4.2 Capacity

For operation of the oil recovery equipment, the following two alternatives for outlets on deck must be satisfied:

- *295 litres per minute at 280 bar*
- *390 litres per minute at 240 bar*

If the same power source operates the vessel's discharge pumps, 50% of the discharge pumps' total power requirements will be in addition to what has been mentioned above.

3.4.3. Hydraulic couplings

All hydraulic couplings on board must be acid-proof female couplings.

The high-pressure pipeline must have a shut-off valve, and branch into two outlets with the following 1¹/₄" couplings:

- *Snap Tite S71-3C16-20RP with "sleeve lock"*

The return pipeline must branch into two outlets with the following 1¹/₂" couplings:

- *Tema - Flat face FF10010 - 150 RV*

The drainage pipeline must branch into two outlets with the following 1/2" couplings:

- *Tema 5010 RV*

4 MISCELLANEOUS

4.1 Log

The vessel must be equipped with a log to measure the relative speed through the water.

4.2 Pilothouse – cable duct

The pilothouse must be prepared for a cable duct from the external down-link antenna.

4.3 Current meter

The vessel must be equipped with a current meter.

5 APPROVAL

5.1 Design drawings

The following drawings must be sent electronically (AutoCad) and as a hardcopy (one copy) to NOFO for approval:

- Tank Plan
- Oil recovery system, Piping diagram
- Main deck arr. for Oil Recovery equipment
- Hydraulic piping diagram

- Stern gate

Drawings or appendices must contain the following information:

- The number and size of ORO tanks
- Hydraulic pump capacities
- ORO pump capacity, pressure and NPSH
- Capacity calculations for the discharge system, including calculation of pressure loss in the pipe system
- Orifices and valve arrangement in the ORO system
- Deck anchoring points for NOFO equipment
- Location of couplings for hydraulic, loading / discharge lines and electrical outlets.
- Design of any deck layout that requires time when preparing for mobilization (stern gate, oil skimmer base, etc).

5.2 Inspection

A NOFO representative will inspect the vessel once it is ready for operation.

5.3 Capacity tests

Before final approval as an **"Oil Recovery Vessel according to NOFO standard"**, the vessel must be inspected at one of NOFO's spill contingency bases and capacity tests will be conducted on hydraulic and discharge pumps.

In some cases, it will be possible to conduct tests by discharging oil / emulsion. During such tests, the vessel must be able to demonstrate and meet the discharge capacity requirements specified in this standard.

5.4 Certificates

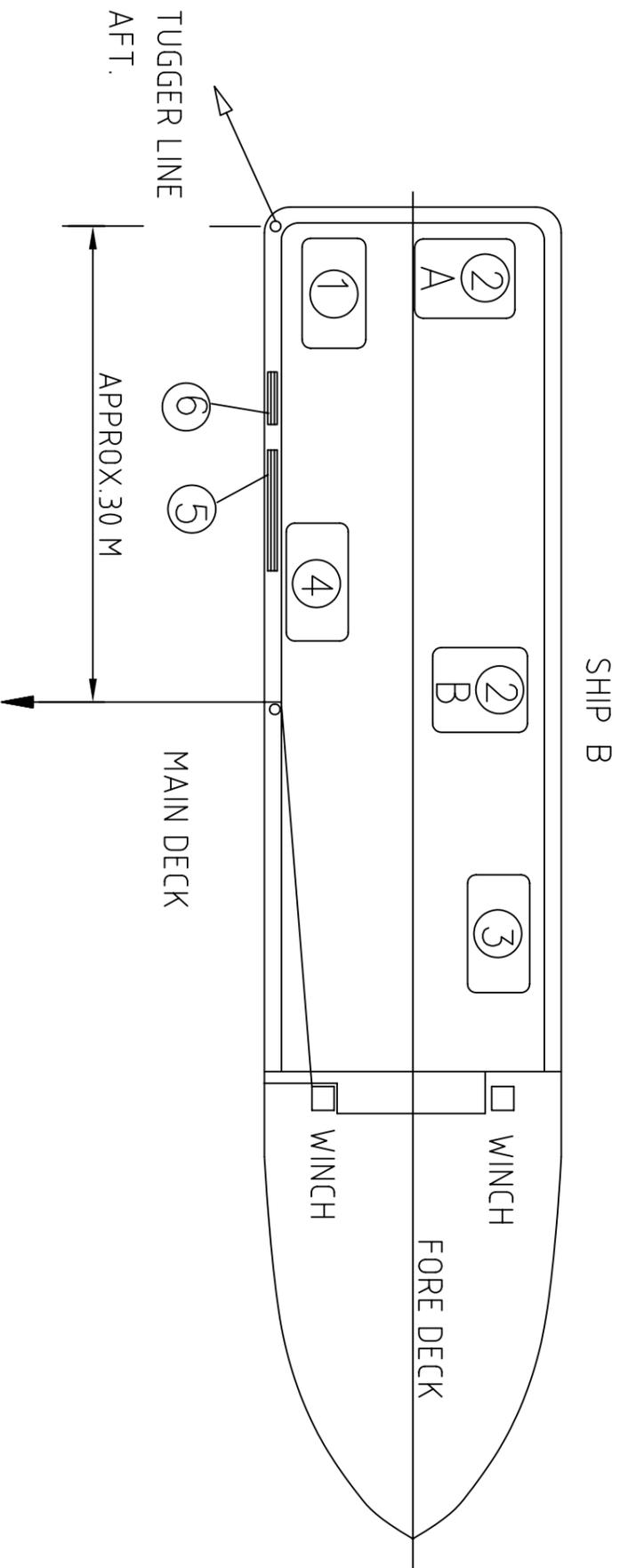
The certificate is issued to the ship owner and is valid for three years or as long as the vessel is part of NOFO's standby fleet. Vessels, which have been out of the NOFO standby fleet for more than three years must be reinspected and re-approved before they can be used in NOFO's standby fleet.



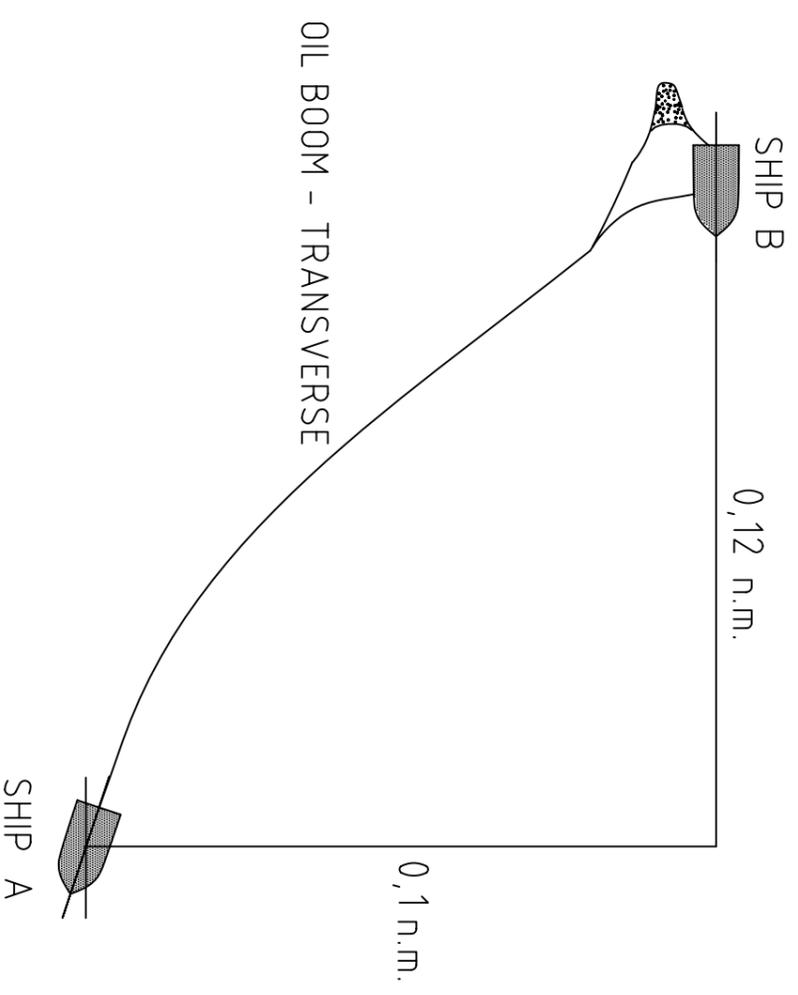
Attachment 1

NOFO STANDARD
for
OIL RECOVERY VESSELS

DRAWINGS



TUGGER LINE TRANSVERSE
 PULL LOAD: 15,0 T.
 LINE LENGHT: 110 M.



POS.NOS.	DESCRIPTION
1	TRANSREC
2A	OIL BOOM DRUM
2B	OIL BOOM DRUM
3	WORK SHOP CONTAINER
4	EQUIPMENT CONTAINER
5	DISCHARGE MANIFOLD
6	HYDRAULIC MANIFOLD

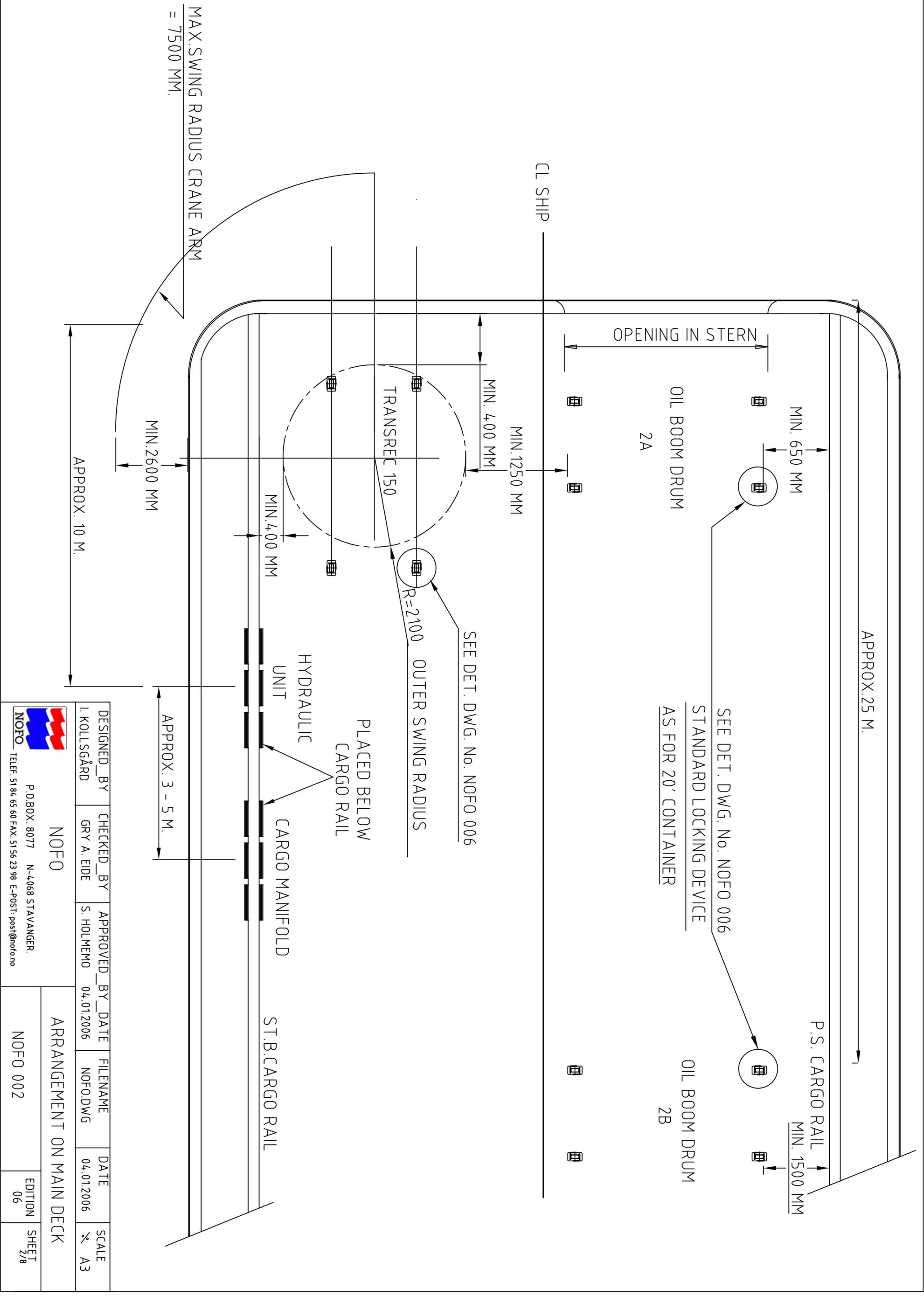
DESIGNED BY	CHECKED BY	APPROVED BY	DATE	FILENAME	DATE	SCALE
TERJE CLAUSEN	GRY A. EIDE	S. HOLMEMO	05.09.2005	NOFO.DWG	05.09.2005	% A3


 P.O.BOX: 8077 N-4068 STAVANGER.
 TELEF: 51 84 65 60 FAX: 51 56 23 98 E-POST: post@nofo.no

EQUIPMENT PLAN ON MAIN DECK

NOFO 001

EDITION 06 SHEET 1/8



MAX. SWING RADIUS CRANE ARM
= 7500 MM.

APPROX. 25 M.

MIN. 650 MM

OIL BOOM DRUM
2A

OPENING IN STERN

CL SHIP

MIN. 1250 MM

MIN. 400 MM

TRANSREC 150

R=2100 OUTER SWING RADIUS

SEE DET. DWG. No. NOFO 006

PLACED BELOW
CARGO RAIL

HYDRAULIC
UNIT

CARGO MANIFOLD

ST. B. CARGO RAIL

P.S. CARGO RAIL

MIN. 1500 MM

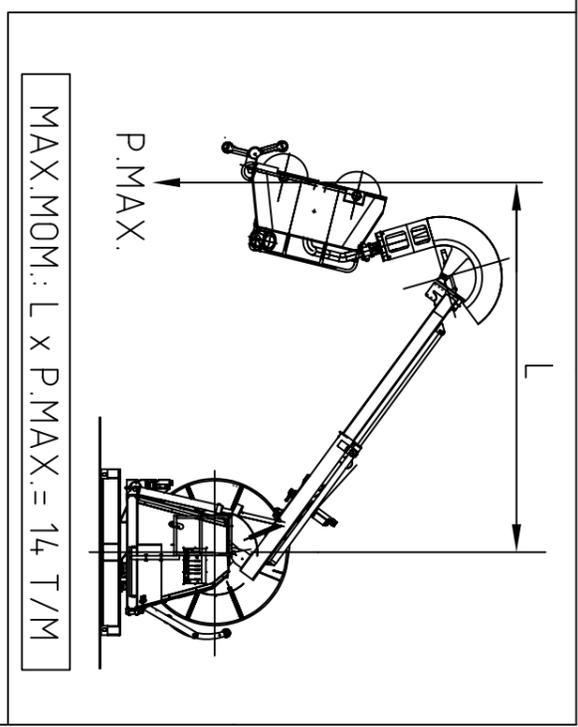
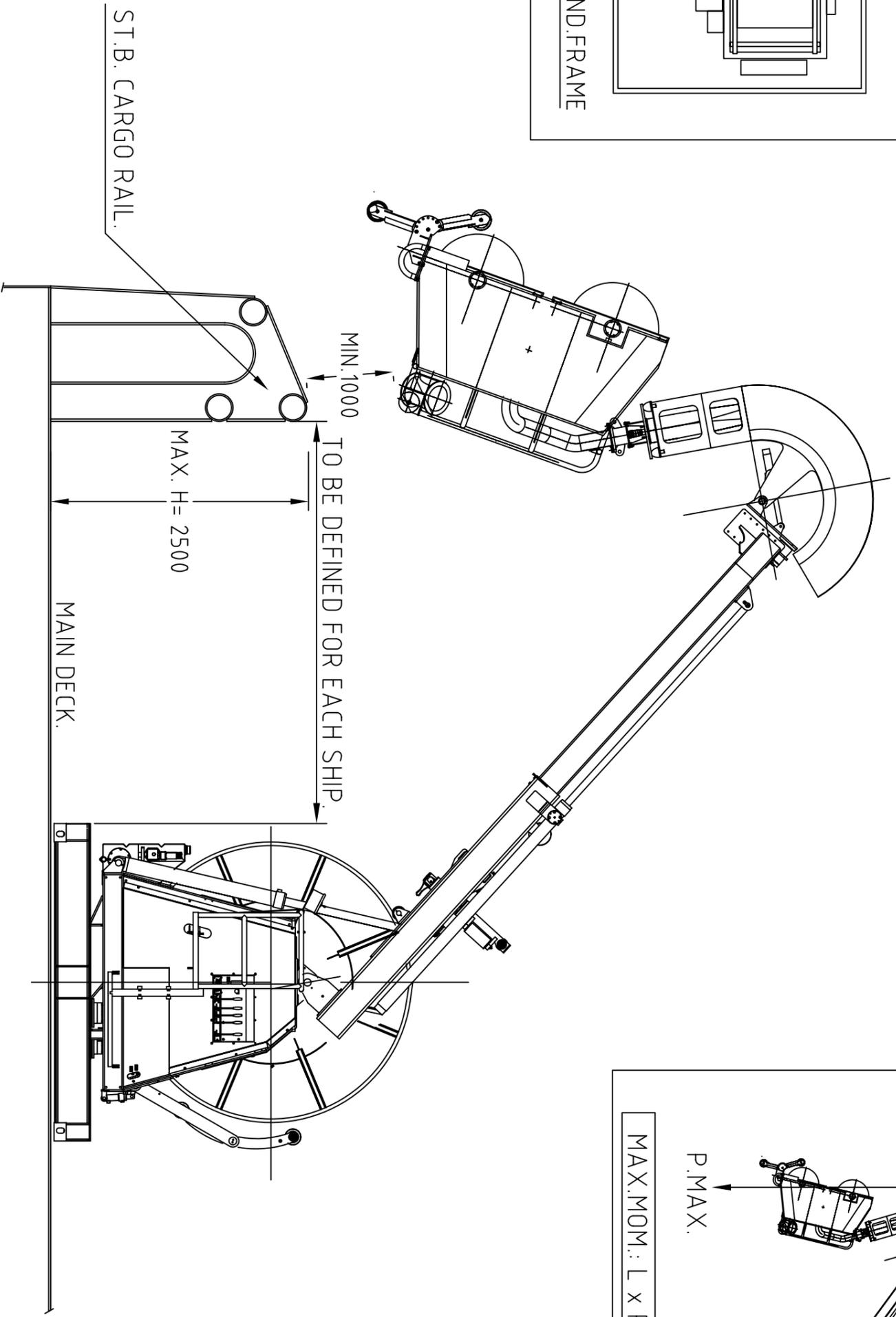
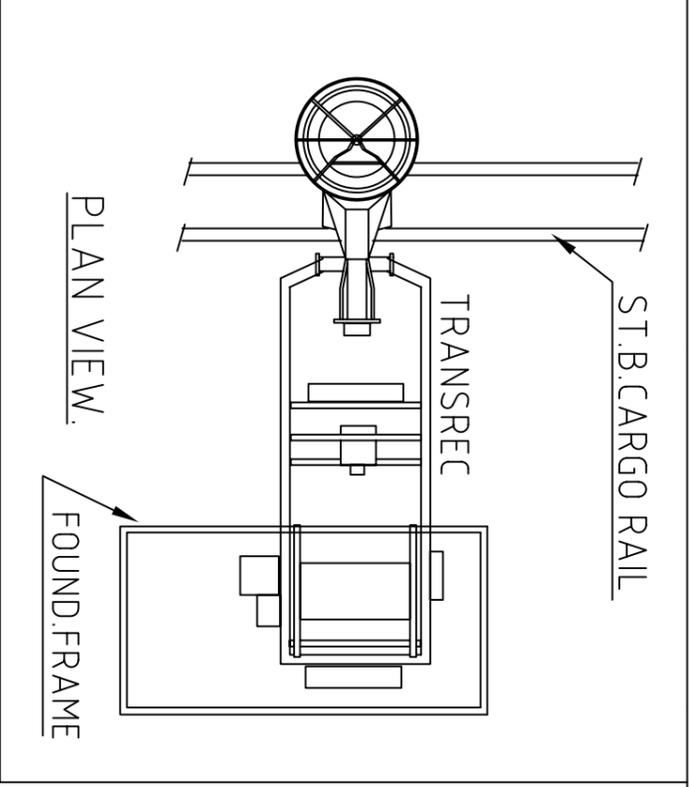
OIL BOOM DRUM
2B

MIN. 2600 MM

APPROX. 10 M.

APPROX. 3 - 5 M.

DESIGNED BY I. KOLLSGÅRD	CHECKED BY GRY A. EIDE	APPROVED BY S. HOLMEMO	DATE 04.01.2006	FILENAME NOFO.DWG	DATE 04.01.2006	SCALE % A3
NOFO			ARRANGEMENT ON MAIN DECK			
P.O. BOX. 8077 N-4068 STAVANGER.			NOFO 002			
TELEF. 51 84 65 60 FAX. 51 56 23 98 E-POST: post@nofo.no			EDITION 06		SHEET 2/8	

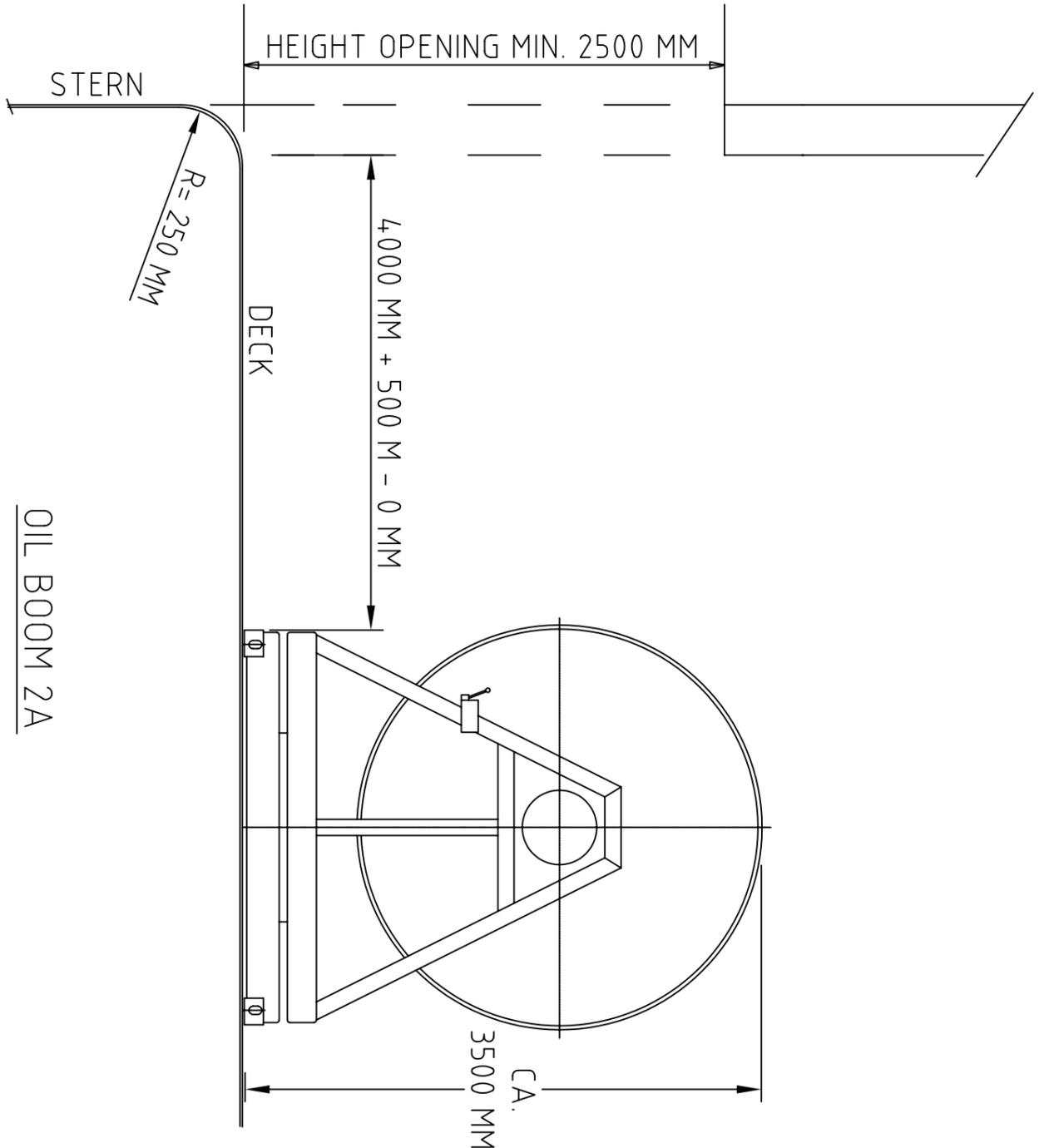
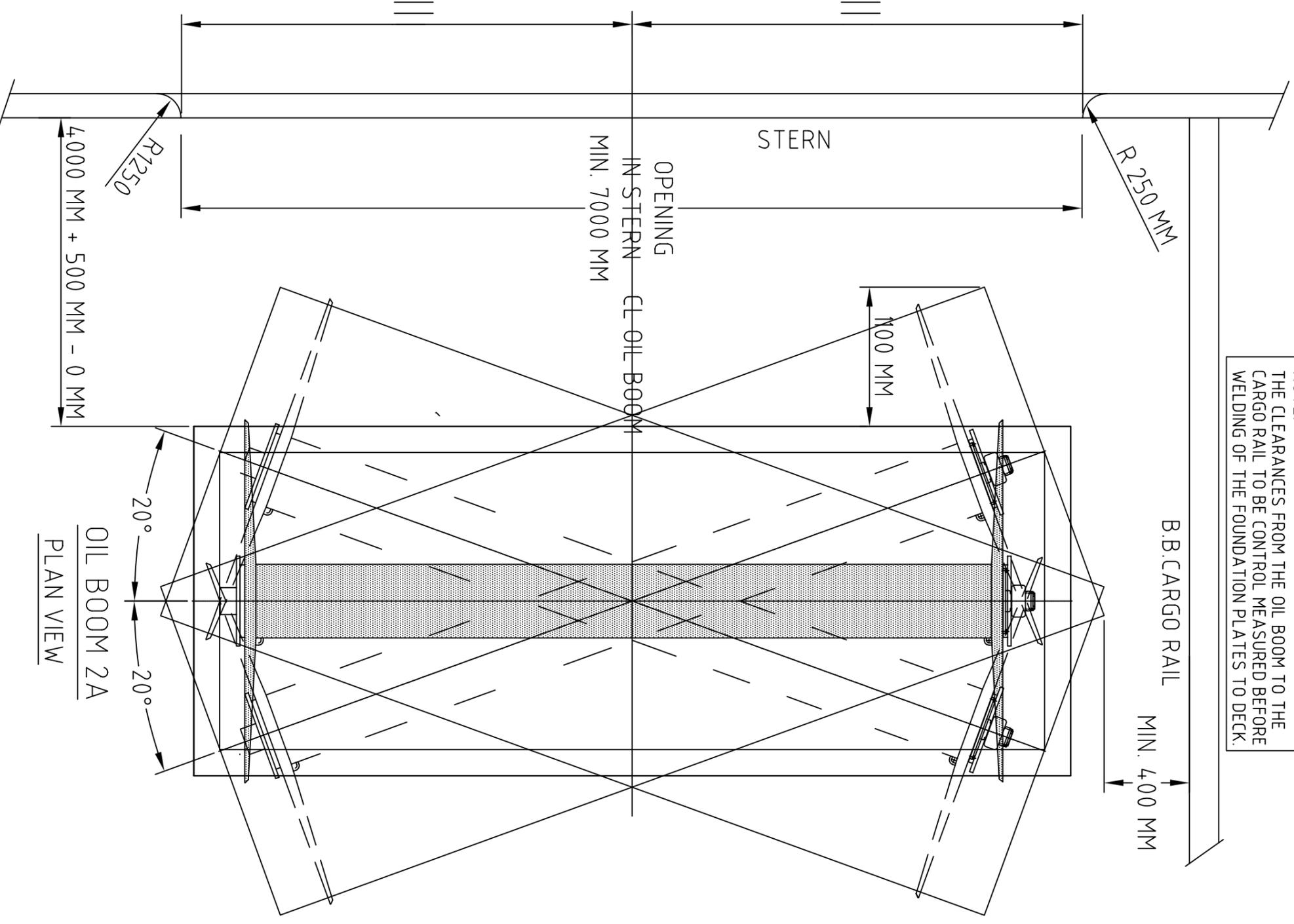


TRANSREC 150
SEEN FROM FORWARD.

NOTE !
ALL CLEARANCES BETWEEN THE CARGO RAIL OR ANY OTHER SHIP HULL ELEMENTS, TO BE CONTROL MEASURED BEFORE WELDING OF THE FOUR FOUNDATION PLATES TO DECK.

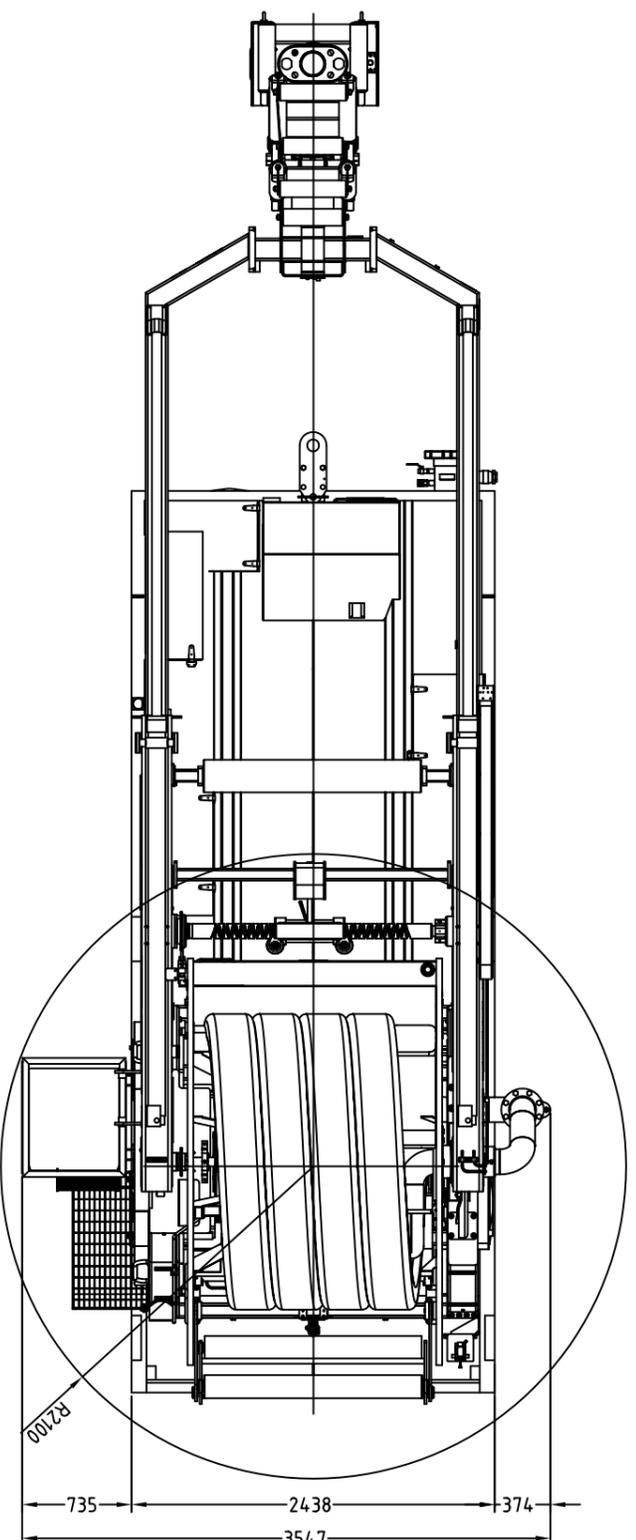
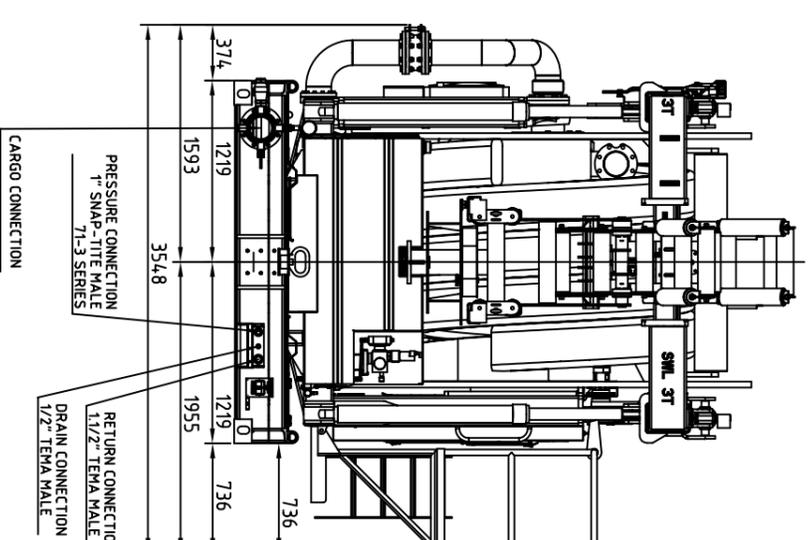
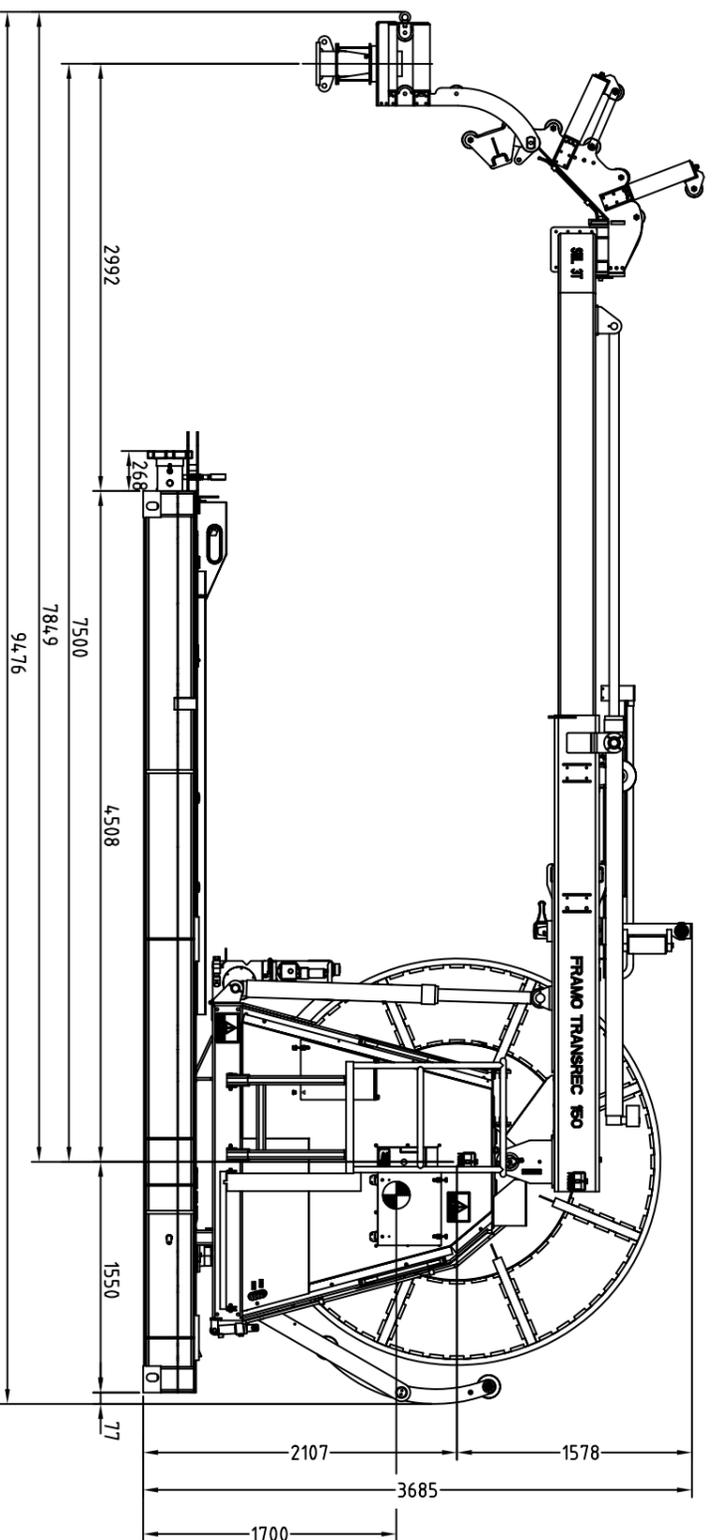
DESIGNED BY TERJE CLAUSEN	CHECKED BY GRY A. EIDE	APPROVED BY S. HOLMEMO	DATE 05.09.2005	FILENAME NOFO.DWG	SCALE % A3
NOFO			TRANSREC-CLEARANCES TOWARDS CARGO RAIL		
P.O.BOX. 8077 N-4068 STAVANGER		NOFO 003		EDITION SHEET 06 3/8	
TELEF. 51 84 65 60 FAX: 51 56 23 98 E-POST: post@nofono					

NOTE!
THE CLEARANCES FROM THE OIL BOOM TO THE CARGO RAIL TO BE CONTROL MEASURED BEFORE WELDING OF THE FOUNDATION PLATES TO DECK.



OIL BOOM 2A
SECTION

DESIGNED_BY TERJE CLAUSEN	CHECKED_BY GRY A. EIDE	APPROVED_BY_DATE S. HOLMEMO 05.09.2005	FILENAME NOFO.DWG	DATE 05.09.2005	SCALE % A-3
NOFO P.O.BOX. 8077 N-4068 STAVANGER. TELEF. 51 84 65 60 FAX. 51 56 23 98 E-POST: post@nofo.no			OIL BOOM 2A CLEARANCES AND ROUNDING OF STERN		
			NOFO 004	EDITION 06	SHEET 4/8



TRANSREC 150
 WEIGHT 18,5 T WITH
 WATER FILLED HOSES.

DESIGNED_BY I. KOLLSGÅRD	CHECKED_BY GRY A. EIDE	APPROVED_BY_DATE S. HOLMEMO 09.01.2006	FILENAME NOFO.DWG	DATE 09.01.2006	SCALE % A-3
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NOFO

P.O. BOX 8077 N-4068 STAVANGER.



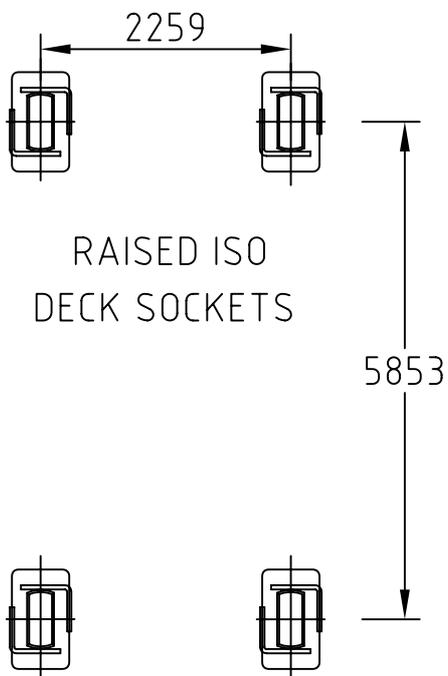
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TRANSREC 150

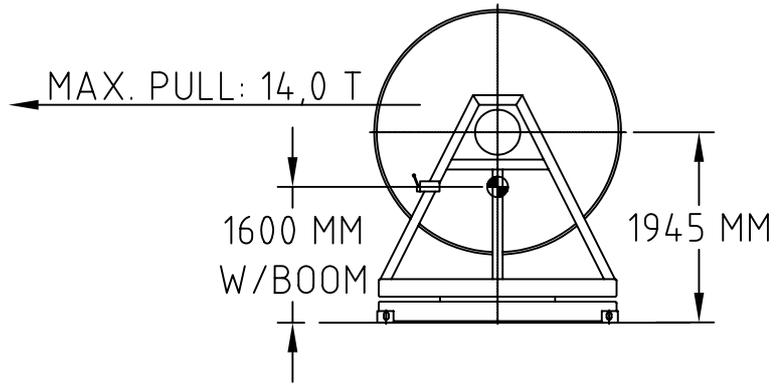
NOFO 005

EDITION
06

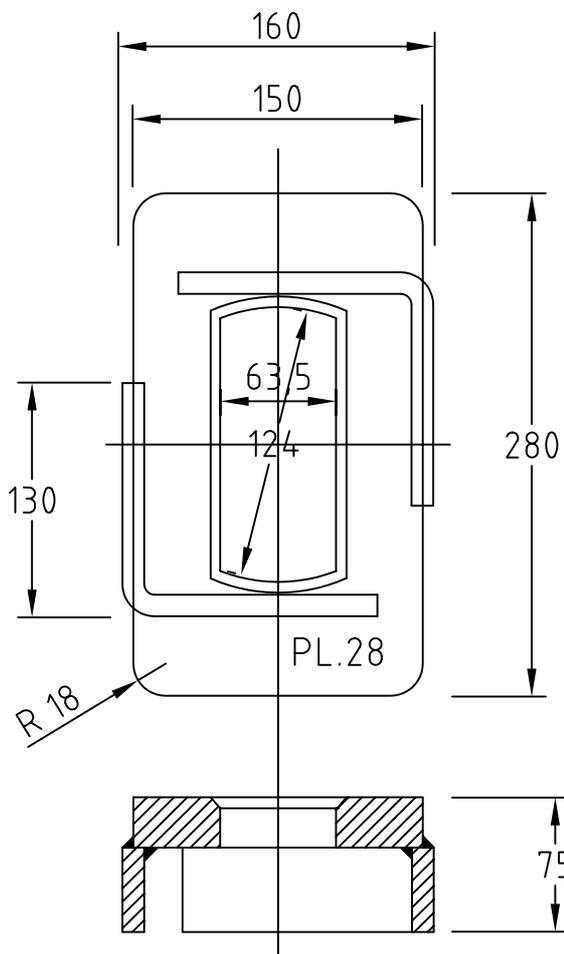
SHEET
5/8



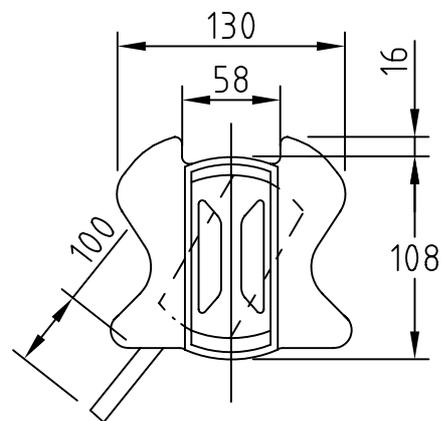
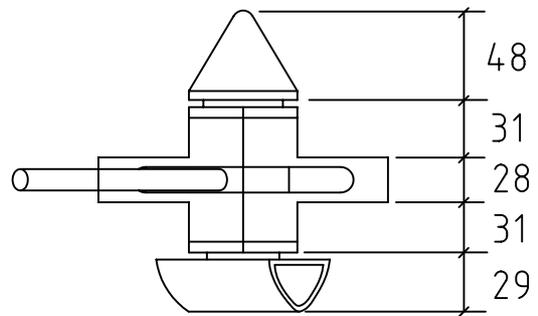
RAISED ISO
DECK SOCKETS



OIL BOOM UNIT
WEIGHT WITH BOOM: 17,0 T.



RISED ISO DECK SOCKET
SINGEL TYPE



TWISTLOCK

Shear: MSL: 210 kN TL: 263 kN MBL: 420 kN
Tension: MSL: 250 kN TL: 313 kN MBL: 500 kN

DESIGNED_BY
I. KOLLSGÅRD

CHECKED_BY
GRY A. EIDE

APPROVED_BY_DATE
S. HOLMEMO 03.01.2006

FILENAME
NOFO.DWG

DATE
03.01.2006

SCALE
A-4

NOFO

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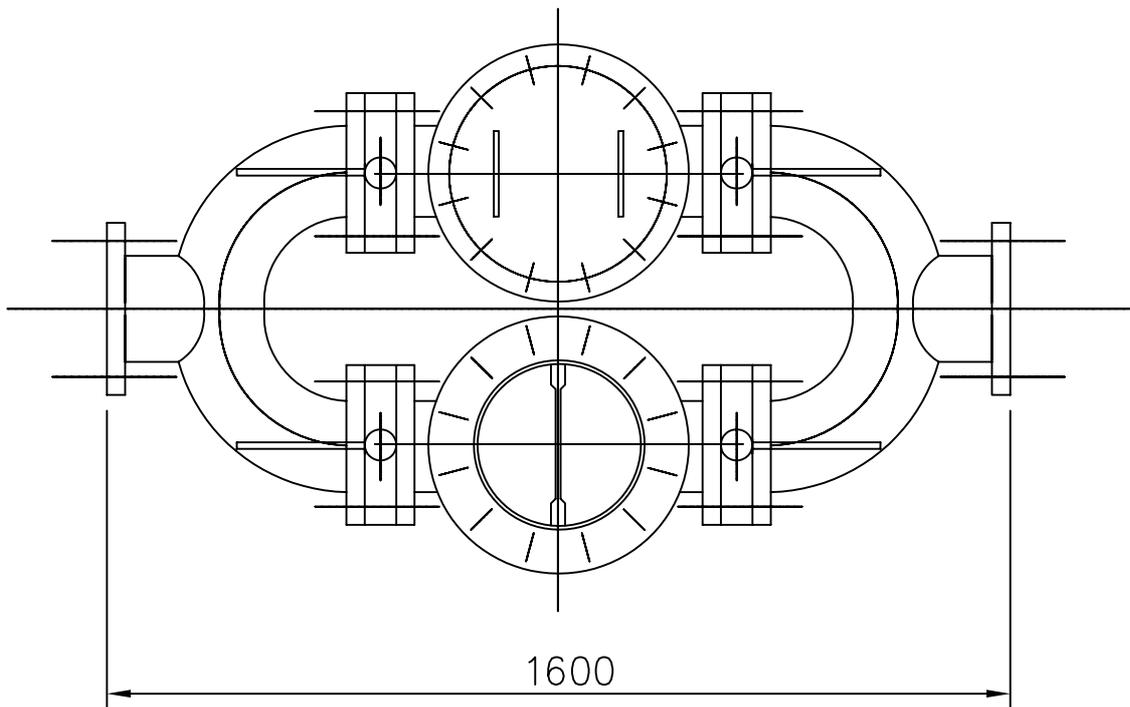
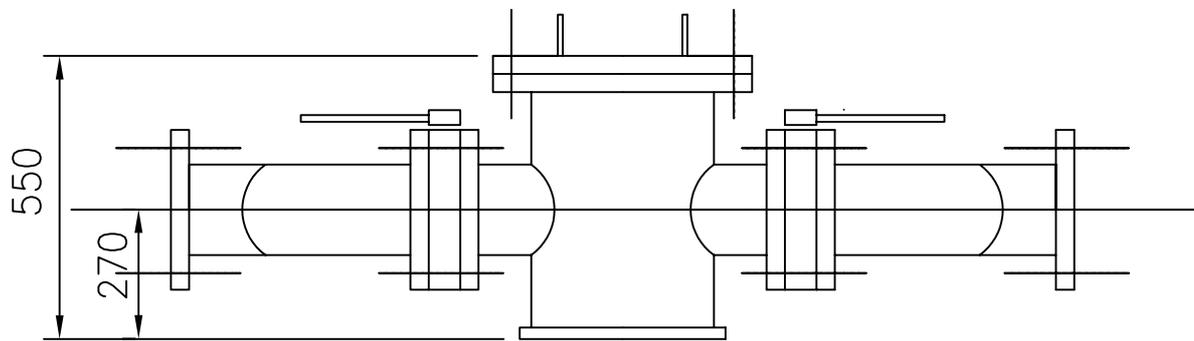
TELEF. 51 84 65 60 FAX. 51 56 23 98 E-POST: post@nofo.no

OIL BOOM DRUM 2A, 2B AND TRANSREC 150
ISO DECK SOCKET WITH TWISTLOCK

NOFO 006

EDITION
08

SHEET
6/8



DESIGNED_BY
TERJE CLAUSEN

CHECKED_BY
GRY A. EIDE

APPROVED_BY_DATE
S. HOLMEMO 05.09.2005

FILENAME
NOFO.DWG

DATE
05.09.2005

SCALE
% A-4

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ND 150 FILTER UNIT
PRINCIPLE SKETCH

NOFO 007

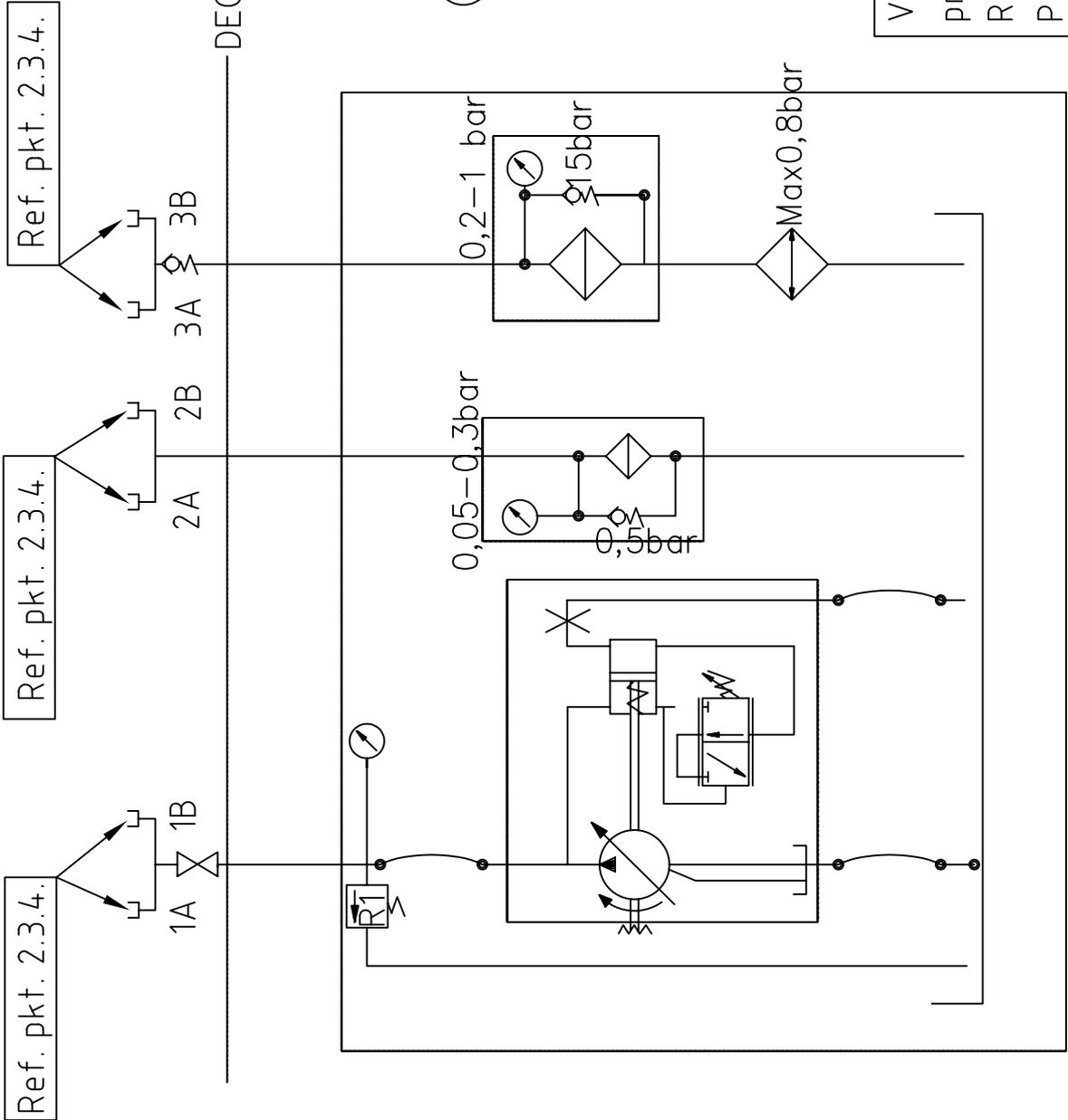
EDITION
06

SHEET
7/8



1A - 1B: PRESSURE LINE
 2A - 2B: DRAIN LINE
 3A - 3B: RETURN LINE

HURTIGKOBBLINGER



Variable pump with constant pressure control.
 Rate : (390 l/min.) 295 l/min.
 Pump pressure: (240 bar) 280 bar.
 Valve setting: (300 bar) 300 bar.

DESIGNED_BY
TERJE CLAUSEN

CHECKED_BY
GRY A. EIDE

APPROVED_BY_DATE
S. HOLMEMO 05.09.2005

FILENAME
NOFO.DWG

DATE
05.09.2005

SCALE
A-4



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SYSTEM FOR OPERATING OF NOFO'S EQUIPMENT
 PRINCIPLE SKETCH

NOFO 008

EDITION
06

SHEET
8/8