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Your ref.
AESOP

Our ref.
OIS-4939/Mil

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AESOP Design Review

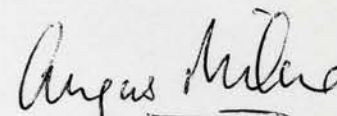
DNV have completed a review of the Prototype AESOP and have found it to be acceptable for the purpose of demonstrating that oil / gas separation [simulated by separating air from water] can be achieved underwater in the Kockums Ship Lift Facility.

Limitations and comments to the prototype design and guidance for future production models are noted in appendix A to this letter.

Yours faithfully
for DET NORSKE VERITAS B.V.


D. Bridge
Manager, Offshore & Industry Services




Angus Milne
Senior Engineer



Appendix A

Structural Review Comments

We have reviewed the main structural elements presented in the drawings:

P2808-120-01	Rev.1	P2808-140-02	Rev.1
P2808-120-02	Rev.1	P2808-140-03	Rev.0
P2808-120-0101	Rev.0	P2809-200-	Rev. -
P2808-120-0102	Rev.0	P2809-201-	Rev. -
P2808-120-0103	Rev.0	P2809-201-001	Rev. -

to the relevant parts of DNV Rules for Planning and Execution of Marine Operations 1996 (lifting condition), considering an onshore lifting (test tank), well controlled operation, and we have the following findings:

Upper structure:

- Some connections are acceptable however very near the allowable limit.
- The pin shackle diameter should not be less than 84mm.

We have not assessed the structure for other conditions (outside the present prototype scope). However, we can advise the following aspects:

In case of Offshore installation the following points should be considered:

Upper and Base structure:

- An additional care should be paid for the structural verification. Some major reinforcements, members and connections, should be made. Consideration should be given to the dynamics and distortion/flexibility of the protecting frame. It is necessary to address how the installation is to be performed:
 - a) Through a moon pool
 - b) Standard offshore/subsea installation

The installation procedure and calculation note must follow the Rules for Planning and Execution of Marine Operations Part 2, Chapter 6, "Sub-Sea Operations" - January 1996. The fact that an object is lowered through a moon pool is taken into account by adjusting the mass and drag coefficient in the chapter 2.4.2.

For the in-place condition the upper and base structure should be designed to the following aspects:

- Dropped object : depending on scenarios defined for specific site/ procedure/ operation.
- Trawling gears: Some information can be derived from the DNV Classification Note No 13: "Interference Between Trawl Gears and Pipelines" - September 1997.
- Design forces, i.e. tie-in forces
- Interaction between structure and piping equipment (can be governing for the piping design).
- Retrieving.
- Foundations.



Electrical Review

Comments and Assumptions for the electrical system are noted below :

- Cable size / conductors [ampacity] shall be selected with reference to environmental temperature and cable / conductor length.
- We assume that discrimination of fuses F1-3 and F4 for the prospective fault levels have been considered
- We assume that F1-3 is suitable for the pump motor starting transient
- We assume that the 230 / 24 VDC rectifier output has built in short circuit protection.

Mechanical Review

We accept the pressure vessel verification undertaken by SAQ.

End of Appendix