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## **Innovative Pipe System for Offshore LNG Transfer**

Dr.-Ing. C. Frohne / Nexans Deutschland Industries GmbH & Co KG , F. Harten / Nexans Deutschland Industries GmbH & Co KG, K. Schippel / Nexans Deutschland Industries GmbH & Co KG, Knut Erik Steen / Seaflex AS, Rune Haakonsen / Seaflex AS, Jørgen Eide / Framo Engineering AS, Jon Høvik / Aker Kvaerner Pusnes

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### **Abstract**

For more than 30 years LNG ship to ship loading has been addressed by several Gas operators. One of the main technical challenges that have been identified has been how to extend and combine the proven technologies of static small bore diameter cryogenic piping and offshore ship to ship transfer of oil to large diameter offshore LNG transfer.

In the last years the market has pushed for flexible piping suitable for LNG offshore loading systems, and the industry has responded with different technical solutions based on very different design criteria. In this paper the basic requirements for a LNG offshore loading system are presented. As a minimum the requirement of the European code prEN 1474 – II is quoted.

### **Design Classification of LNG Flexible Pipes**

Today there are two completely different flexible pipes designs existing on the market, both are proven in their applications

1. Composite hoses
2. Flexible metal pipes based on corrugated stainless steel pipes (sometimes called “bellows” although not necessarily based on the bellows technology, which is in principle limited in length)

The composite hose is a proven technology for a wide range of applications, amongst others the offshore loading of all kind of ambient temperature liquids. In the LNG business they are available as emergency unloading hoses.

The flexible metal pipe has been used in smaller diameters for more than 30 years for all kind of cryogenic applications, transfer lines for Liquid Nitrogen, Helium and even Hydrogen and Oxygen.

So for both design options, the LNG ship to ship loading is a new application of a well known technology.