

ANNULUS VACUUM & VOLUME TEST

NKT Flexibles' pipes are designed to resist the most severe impacts from operation and environment. However, NKT recommends that periodical annulus and vacuum and volume testing form part of an integrity monitoring program for the flexible pipe system. These tests function as an early warning of potential damage to the flexible pipe which could lead to a hazardous situation. NKT Flexibles offers to undertake these tests thereby utilizing the technical experience NKT Flexibles possess of the whole flexible pipe system.

- TEST OBJECTIVES
- *Test for damaged outer sheath*
 - *Test of end fitting seal system*
 - *Determine free annulus volume*
 - *Test for flooded annulus*
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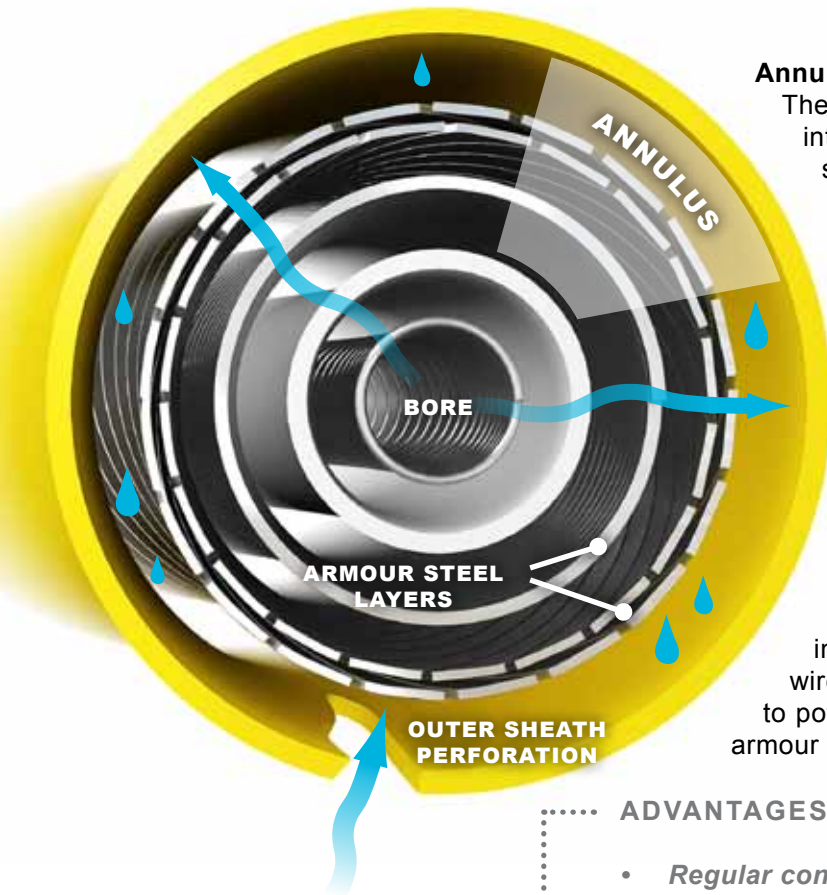
Annulus Vacuum Test

The purpose of the annulus vacuum test is to verify the integrity of the outer sheath and the end fitting sealing system. During installation and operation, there is a risk of perforation of the outer sheath e.g. due to dropped objects and the annulus may be filled up with raw seawater. In worst case scenario, corrosion processes may seriously reduce the service life of the pipe unless repair is performed immediately.

Annulus Volume Test

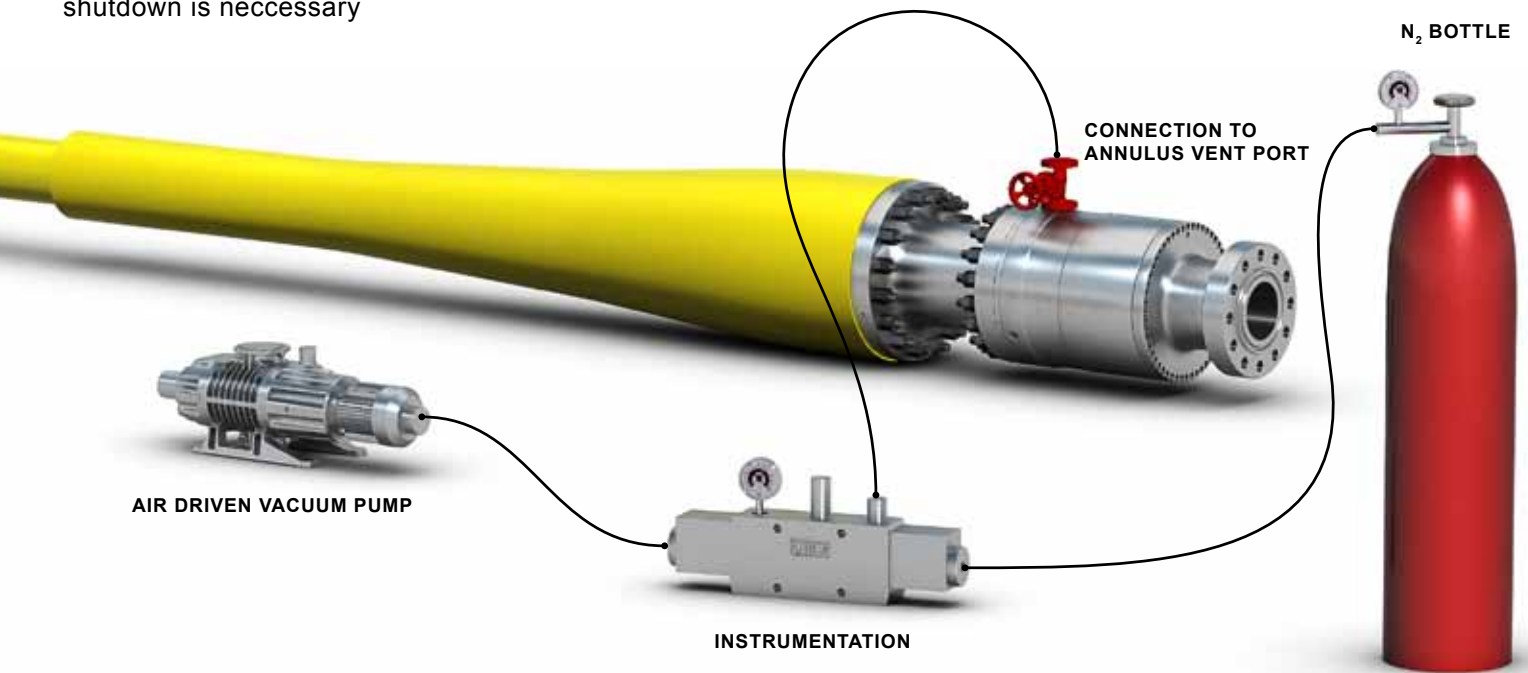
The purpose of the annulus volume test is to determine the free annulus volume serving as an indication of a possible water filling of the annulus due to water condensation and/or damage to the outer sheath. Water condensation may occur if water vapor from the bore diffuses into the annulus and condensates on the armour wires thereby gradually filling up the annulus leading to potential corrosion and hydrogen embrittlement of the armour wires if not managed properly.

- ADVANTAGES of PERIODICAL TESTS
- *Regular confirmation of outer sheath integrity*
 - *Detection of damages in due time avoiding extensive repairs later in service life*
 - *Benchmarking against the FAT Test and previous offshore tests*
 - *Regular dialogue with a vendor of flexible pipes with regards to interpretation of the test results*
 - *An increased possibility for extended service life*



Annulus Vacuum & Volume Test

All instrumentation is provided by NKT Flexibles preassembled for easy connection to the topside end fitting offshore. The pressure manometers are ATEX IS certified (II 2G EEx ia T4) thus intrinsically safe. No power supply is needed as the manometers are driven by batteries and the vacuum pump by pressurized air. Note that the tests can be performed in service and no shutdown is necessary



..... NKT SCOPE of SERVICE

- *Preparation of site specific test procedure*
- *Mobilization of certified equipment*
- *Mobilization of qualified offshore personnel*
- *Vacuum test*
- *Volume test*
- *Measurement of gas flow rate*
- *Test report with interpretation of results*



NKT's test spread is light weight and can be carried offshore by helicopter