Sand is an inevitable by-product during oil and gas production. Sand can have significant consequences for both the production and the assets. Key failure modes are related to sand particle erosion, sand accumulation, plugging or contamination by sand.

**Erosion testing by DNV GL labs**
The process laboratory at DNV GL headquarters at Høvik, just outside Oslo, has been in operation since 1995 and has been used extensively in experiments related to sand erosion, sand monitoring equipment and sand transport phenomena. Experience from experimental investigation and dedicated erosion testing form the basis of the DNV GL recommended practice DNVGL-RP-0501 Managing sand production and erosion. Laboratory erosion testing is supported by advanced computer models such as Computational fluid dynamics (CFD) and multi-disciplinary advisory teams.

**Test facility**
The current test facility includes the following test rig set-ups:
- Small scale 3-inch multiphase flow loop, capable of injecting water, air and sand
- Large scale high flow capacity erosion rig, capable of performing erosion testing in 5 - 10-inch set-ups with air velocities up to 60 m/s
- Sand blasting rig, capable of performing testing of candidate material samples to determine the erosion resistance as a function of particle impact characteristics according to ASTM G76-13. Impact velocities up to 150 m/s.
Material Testing
The standard test for determining the erosion resistance of a material is to expose a material test sample to a given amount and size of particles at different impact velocities and angles (ASTM G76-13). The sand blasting rig in the DNV GL process laboratory is capable of determining the material erosion resistance according to ASTM G76-13. Testing can be performed with particle velocities up to 150 m/s. Small amounts of water may be added to investigate the effect of liquid dampening on the erosion resistance. Previous materials investigated include steel grades, plastics, ceramics and erosion resistant surface coatings.

Large Scale Erosion Testing
The large scale erosion test rig is capable of performing erosion testing of 5 - 10 inch components with air velocities up to 60 m/s (see layout above). Testing may be performed with sand particles down to 100 micron. DNV GL has previously performed large scale erosion testing of rigid pipework, unbonded flexible pipes (according to API RP 17B), sand monitoring equipment including acoustic sand detectors and intrusive erosion probes, down-hole sand screens, single and multiphase flow meters and production chokes.

DNV GL FLOW TECHNOLOGY
DNV GL has delivered flow assurance services to the oil and gas industry since the development of the Norwegian continental shelf accelerated in the early 1970s. To meet the challenges faced by our customers DNV GL is utilizing a combination of advanced simulation tools and test facilities as well as our knowledge and professional skills to build confidence in complex technical solutions.

Layout

- Erosion Test Section
- 2x4m Footprint
- Tailored 6”-14” piping geometry or unit
- Sand Drop Out Filter

- Sand fill
- Sand Hopper
- 500kg Sand

- Air Flow: 10 000 m3/h
- Air + Sand