Torus Anchor®

The Torus Anchor is a high capacity, anchor developed by Anchors & Connections B.V.
A need for a high capacity anchor has been identified in both the offshore hydrocarbon business for anchoring of floating supports, and in the Renewable Energy market for both seabed mounted structures and floating platforms.

Proof of concept tests have been carried out by HR Wallingford England, and all required laboratory research and engineering is complete with promising results.

The issue

An increasingly busy sea requiring secure anchoring of floating objects

The need

An anchor with special holding characteristics in sandy soils.

The solution

The Torus Anchor® is able to withstand high forces in all directions. The Torus Anchor® has a unique shape and is placed in sandy soils using a sophisticated water injection system.

Anchors & Connections

port technology

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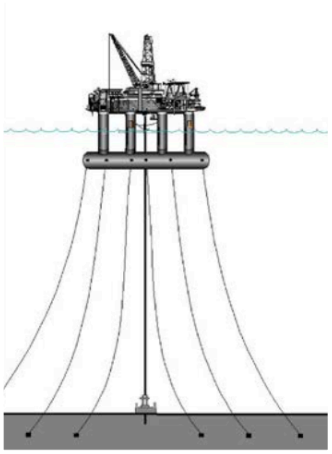


In granular soils, most traditional anchors for mooring buoys, floating platforms, etc. consist of anchor piles, which consist of a steel tube that is driven or vibrated into the seabed. Steel tube anchors are able to withstand radial forces but are much less able to withstand axial forces. Dynamic forces in particular can cause steel tube anchors to break loose. In order to avoid high axial forces traditional steel tube anchors connect to the floating object via long chains but this means that much precious sea surface area may be lost.

The Torus Anchor is an anchor which is able to resist high static and dynamic axial and radial forces with regard to its own mass. It is particularly suitable for when high dynamic loads are present and also for mooring and navigational buoys. The anchor embeds itself by fluidizing the surrounding soil. The Torus Anchor is fully submerged under the seabed surface which is a safety advantage. The Torus Anchor is easy to install in a large range of water depths in granular seabeds using water injection. The installation method of the Torus Anchor only requires a barge with a crane and a suitable water pumping capacity.

The Torus Anchor®:

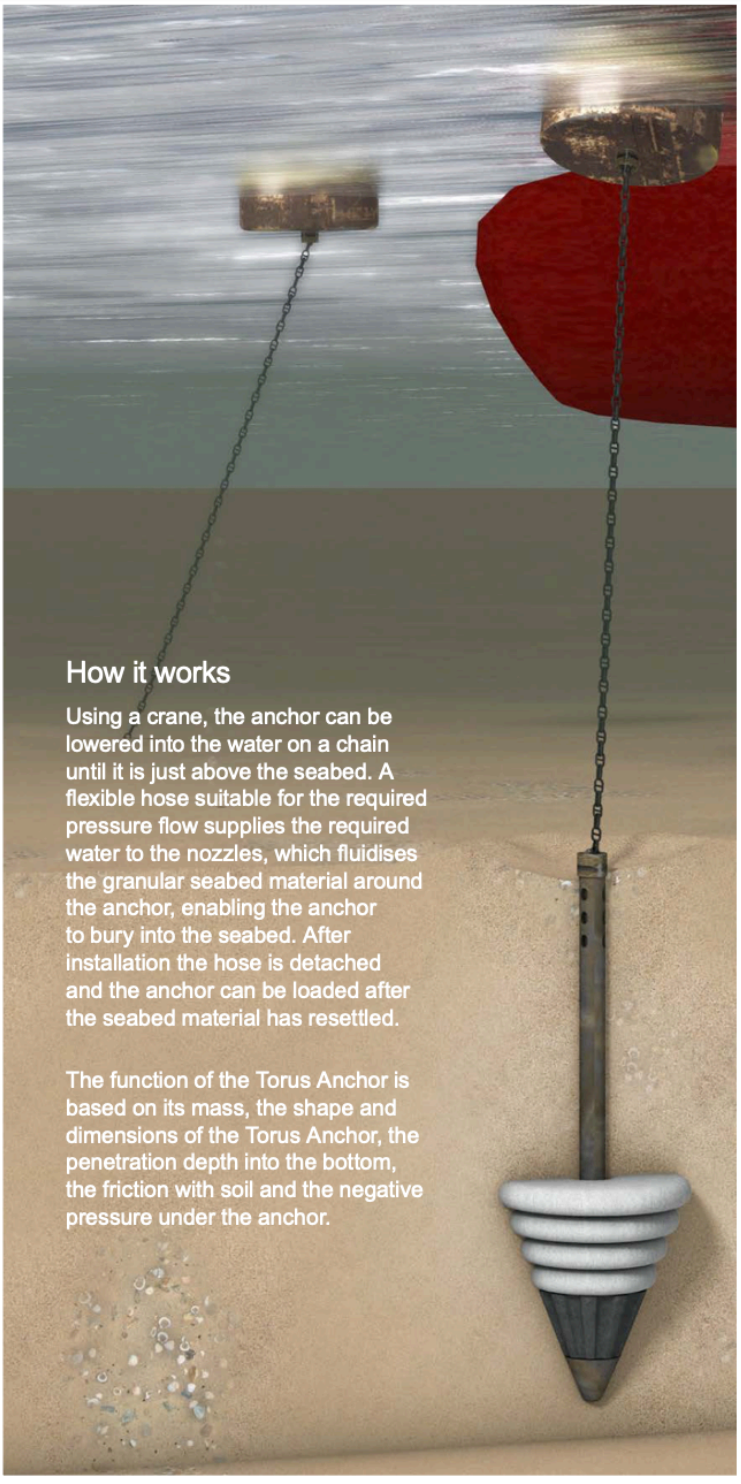
- is available with safe holding forces ranging from 10 to 200 tons and is easy to install;
- has high static and dynamic holding power in all directions;
- is suitable for sandy seabeds and granular soils;
- can be installed with less force and energy than existing anchors;
- is installed without hydraulic hammer or vibration devices which is less harmful to the environment;
- can be submerged under the existing seabed level so that the chain is pulled into the soil;
- can be retrieved using the same water injection system as is used during installation;
- allows more economical use of the available water area;
- allows exact positioning of the anchor

Applications

- Platforms
- Floating windmills
- Navigation buoys
- Fish farms
- Seaweed farms

Features

The Torus Anchor is composed of a steel tube with a fastening shackle which has two degrees of freedom. A wire or chain is attached to this shackle. The tube is filled with concrete and fitted with a water hose. At the end of the steel tube is a steel cone with a nozzle in its point which is connected to the water hose. On the top of the cone rests a frustoconical body of steel and concrete of which the outside is fitted with guiding slots. At the top of the frustoconical body rest torus shaped bodies, increasing in size, consisting of reinforced concrete with a high specific mass (approximately 2500 kg/m3). The required number of torus bodies depends on the required holding capacity and the seabed material characteristics. The Torus Anchor is prevented from moving upwards by a steel ring around the tube.



How it works

Using a crane, the anchor can be lowered into the water on a chain until it is just above the seabed. A flexible hose suitable for the required pressure flow supplies the required water to the nozzles, which fluidises the granular seabed material around the anchor, enabling the anchor to bury into the seabed. After installation the hose is detached and the anchor can be loaded after the seabed material has resettled.

The function of the Torus Anchor is based on its mass, the shape and dimensions of the Torus Anchor, the penetration depth into the bottom, the friction with soil and the negative pressure under the anchor.

Contact

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