

ARCON - A New Technology for the Submerge Production of Artificial Reefs

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Abstract

Based on a series of scientific research projects in the Mediterranean Sea and the Red Sea a new technology has been developed for the submerge production of artificial reefs. In the years 1997 and 1998 ARCON® (Artificial Reef CONstruction) has been further refined under economic aspects in cooperation with marine engineers to a technique applicable for large scale projects also for integrated coastal zone management.

The ARCON® technology uses a special DC-current regime fed by solar energy to produce a hard, nature like substrate in the sublittoral. Anodes (+ pol) of various shape made of an alloy (graphite, titan, synthetics) and cathodes (- pol) made of a simple iron mesh screen are placed into the sublittoral. Following the principle of electrolysis, pure, non-toxic minerals accrete at the cathode (- pol), embedding the iron mesh screen and thus forming whitish, hard coating.

ARCON® substrates with an Aragonite volume of more than 45.0 % show an extremely high bending strength, which was tested for various samples from the Mediterranean Sea and the Carribean Sea. Bending strength values range between 3720.0 P.S.I. (257 kg/cm²) and 5350.0 P.S.I. (368 kg/cm²) for the ARCON® substrates with more than 45.0 % volume of Aragonite. The comparison with seawater impermeable concrete (e.g. BN 35), which ranges at 4978.0 P.S.I. (343 kg/cm²), perfectly demonstrates the suitability of the ARCON® technology for the purposes of submersed artificial reef construction in the sublittoral.

The characteristics of the substrate produced by the ARCON® technology depict the multifold advantages for the production of artificial reefs :

- (i) the substrate for recolonization by marine biota is taken from the seawater itself, is pure and does not contain any hazardous substance
- (ii) the iron mesh screen on which the substrate precipitates may be shaped in a large variety of forms from single artificial reef modules to large artificial reef complexes and thus many of the different marine habitats which naturally occur

- in the sublittoral like large caves, small caves, open areas, crypto-habitats, etc., may easily be designed for an entire artificial reef complex
- (iii) since the necessary energy is taken from solar panels, the ARCON® technology is independent from any coastal source and artificial reefs may be produced even in remote areas or offshore
 - (iv) the application procedures are simple since no larger infrastructure (e.g. harbour) or machines (e.g. vessels) are necessary to construct ARCON® artificial reef complexes in the sublittoral

The ARCON® technology is actually under application within the frame of two large international coastal rehabilitation projects in the Baltic Sea and in the Indian Ocean, financed by various international agencies and institutions.