

# Material solutions for buoyancy, insulation and impact protection for subsea applications



Go deeper with DIAB

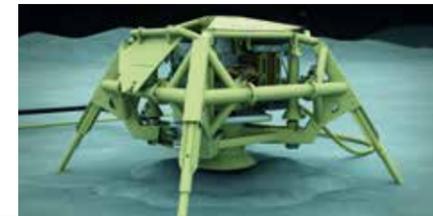
# Reach depths down to 10,000 meters with DIAB's material solutions for subsea applications

The deep waters of our oceans are considered the last frontier of our planet. Exploring these depths under harsh conditions places extreme demands on any equipment used there. To build and design equipment meeting the tough challenges at these depths, high-performance materials are crucial. There is no room for error.

DIAB has been providing material solutions for subsea applications for more than 40 years. We know that strength, buoyancy and insulation together with high quality and long service life are essential

product features for any application. DIAB's full product range and know-how in this area enable us to provide total material and application solutions to our customers worldwide. Whatever your subsea application, our materials can take the pressure.

DIAB's materials Divinycell HCP and Pure Syntactic Foams are applicable in many types of applications within the oil and gas, subsea and oceanographic industries, and provide high performance with regard to strength, impact-resistance, buoyancy and insulation.



# Let us know your requirements...

DIAB works in close collaboration with its customers. Based on an in depth understanding of the needs of our customers, DIAB develops sought-after high-performance material solutions through:

**Innovative thinking** that leads to the best solutions on the market.

**Deep experience** gained from over 40 years of leadership in the sandwich composite field.

**High-performance materials:**

- **Strength** that can withstand water pressure from sea level down to 10,000 meters.
- **Buoyancy and insulation** that permits smooth and sustained operation of your equipment.
- **High-quality** that contributes to low equipment maintenance, long product service life and optimal life cycle economy.

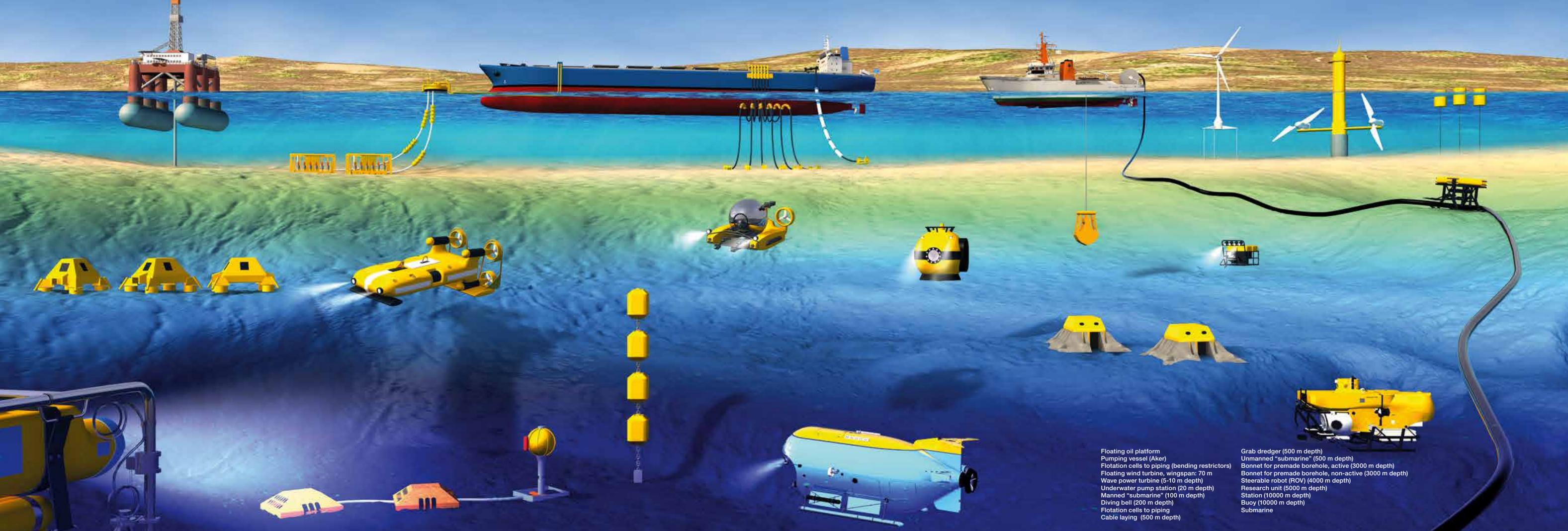
## ...to optimize the life cycle economy of your application

The performance of your application is key. Based on our understanding of your requirements we optimize the life time cost of your applications, ensuring:

**High quality solutions:** Based on knowledge and high performance materials.

**Low maintenance:** Below sea level, you need to have as little maintenance as possible.

**Optimized life cycle economy** of your applications.



- Floating oil platform
- Pumping vessel (Aker)
- Flotation cells to piping (bending restrictors)
- Floating wind turbine, wingspan: 70 m
- Wave power turbine (5-10 m depth)
- Underwater pump station (20 m depth)
- Manned "submarine" (100 m depth)
- Diving bell (200 m depth)
- Flotation cells to piping
- Cable laying (500 m depth)
- Grab dredger (500 m depth)
- Unmanned "submarine" (500 m depth)
- Bonnet for premade borehole, active (3000 m depth)
- Bonnet for premade borehole, non-active (3000 m depth)
- Steerable robot (ROV) (4000 m depth)
- Research unit (5000 m depth)
- Station (10000 m depth)
- Buoy (10000 m depth)
- Submarine

## Materials – Divinycell® HCP

Divinycell HCP is developed to meet the demands for high performance in subsea applications. HCP means Hydraulic Crush Point and the number defines the maximum hydraulic pressure the material can withstand. Divinycell HCP is a low-density cross linked polymer foam with closed cells providing high strength and buoyancy performance due to its unique material formulation. As a result of its excellent hydraulic compressive properties and closed cell structure, it has very low buoyancy loss and wa-

ter absorption under long-term loading conditions, thus making it an ideal material in subsea applications. Moreover, due to its material composition, HCP can be easily machined into almost any shape, enabling designers a high level of design freedom.

HCP has an excellent track record and has been used in subsea applications for almost 40 years, as buoyancy or high performance FRP Sandwich core. With its excellent hydraulic compressive strength

and high buoyancy to weight properties, it is used widely, for example, in ROVs, submarines, flotation units, diving bells and marine impact-protection structures at depths down to 700 meters. DIAB provides Divinycell HCP in blocks or ready-shaped parts.

**Standard range:**  
Divinycell HCP 30, HCP 50, HCP 70, HCP 90, HCP 100.

## Materials – Pure Syntactic Foams

Complementing the DIAB offering, DIAB is also a worldwide distributor of Pure Syntactic Foams. The material composition of Pure Syntactic Foams provides unique mechanical properties well suited to subsea applications below 700 meters depth. High compressive strength, high buoyancy per kilogram and low water absorption make it ideal for subsea applications requiring high performance and long lifetime. Special formulations of Pure Syntactic Foams

can also meet extreme requirements with regard to temperature or fire resistance.

Pure Syntactic Foams are formulated to meet specific depth and buoyancy requirements down to 10,000 meters. The foam is available in blocks, semi-ready, to print or finished products such as low drag buoys, modular buoyancy, and any kind of umbilical systems.

**Standard range:**  
SF 1100, CF 2000, SF 3000, CF 3000, SF 3600, CF 4000, SF 4500, CF 6000, SF 6000, SF 8000, LD 1000, LD 2000, LD 3000, LD 3600, LD 4000, LD 4500, LD 6000, LD 8000, LD 10000.

**High performance range:**  
CF 340, HTG 180, XF 901, XF 905.

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## Material solutions

The full range of DIAB material can be delivered with various grades of customization. All materials can be provided in blocks. DIAB can also provide various levels of customization ranging from making parts to print, standard buoys and also tailored applications based on customer requirements. We listen to your needs and requirements and provide solutions.

### Testing capabilities

Comprehensive testing is the only way to ensure product reliability and long-term performance at depths down to 10000 meters. All materials are readily tested according to standard procedures to ensure material performance.

selection to structural design, manufacturing processes and auditing. DIAB Technical Services ensures that you get the most out of you material solutions and helps you to reach an optimal design.

### DIAB Technical Services

Our powerhouse of composite and material know-how, DIAB Technical Services provides services that are highly valuable to every manufacturer. DIAB Technical Services provides guidance in material

### Helping you to meet challenges

DIAB's mission is to make our customers' products stronger lighter and more competitive. In order to do so, DIAB has a dedicated R&D organization continuously developing new products and solutions for our customers to help them meet their challenges.

### Subsea Buoyancy Solutions

Type	Density, Kg/m³	Buoyancy, Kg/m³	Recommended material										Operational Depth, MSW*			
																0
H 60	60	965														30
H 80	80	945														40
H 100	100	925														55
H 130	130	895														75
H 160	160	865														115
HCP 30	200	825														190
HCP 50	250	775														300
HCP 70	300	725														450
HCP 90	360	665														550
HCP 100	400	625														650
LD 1000	390	635														1000
SF 1100	445	580														1100
LD 2000	425	600														2000
LD 3000	450	575														3000
SF 3000	495	530														3000
LD 4000	475	550														4000
SF 4500	545	480														4500
LD 6000	570	455														6000
LD 8000	635	390														8000
LD 10000	695	330														10000

\* Operational depths are shown for guidance only. Because optimal results depend on time, temperature, frequency, etc., each application must be evaluated individually. Contact DIAB for guidance in selecting material to your operational conditions.

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# Go deeper with DIAB

DIAB is a world-leading supplier of solutions designed and manufactured in sandwich technology. To fully answer the wide range of requirements on depth and performance by the offshore and oceanographic sectors, DIAB provides materials that are specially developed for subsea applications.

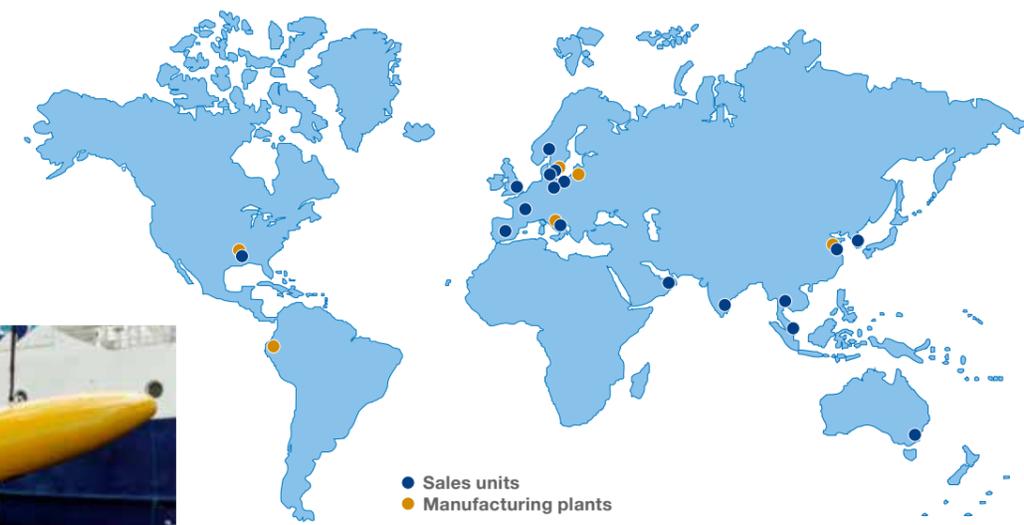
Our materials have a unique combination of properties providing excellent buoyancy/kg, high strength, good thermal/acoustic insulations characteristics,

low weight and excellent chemical resistance. Our high-performance materials, in combination with long-term experience within subsea and added-value capabilities enable us to deliver solutions meeting the ultimate subsea requirements: high quality and long lifetime.

The backbone of our offering is Divinycell HCP and Pure Syntactic Foams. Divinycell HCP, used at depths ranging from sea level to 700 meters, has a proven

track record ranging over 40 years in subsea applications. Pure Syntactic Foams can be used at depths ranging from 700 down to 10,000 meters, enabling DIAB to provide excellent performance range. Our combined capabilities in Divinycell HCP and Pure Syntactic Foams – in production, know-how, research and support – ensure you of a valuable partner providing optimal material solutions for a wide range of subsea applications.

Through dedicated R&D, DIAB is continuously innovating and developing material solutions that continually improve the performance of subsea applications.



# Making you more competitive

DIAB is a world-leading supplier of sandwich composite solutions that make our customers' products stronger, lighter and more competitive. Our extensive experience in providing sandwich composite solutions to customers has made DIAB a leading partner in the sandwich composite industry. DIAB's solutions combine high-performance core materials, value-added kits, engineering and process services.

**Core materials | Knowledge | Kits | Processing | Engineering | Training |  
Global presence – local service**

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