

The high performance sandwich core

Divinycell HCP grade meets the demand for a high performance, low density buoyancy material with excellent characteristics. It is widely used in subsea buoyancy units, ROVs, diving bells and impact protection structures. As a result of its excellent hydraulic compressive properties and closed cell structure, it has very low buoyancy loss and water absorption under long-term loading conditions. The insulation properties of HCP are also good. HCP stands for Hydraulic Crush Point and is defined as the point of pressure in Bar, where the

material when subjected to an increasing pressure of 1-2 Bar/sec has lost 5% of its initial volume. The design of subsea buoyancy applications is complex and consideration has to be given to the required buoyancy loss and updrift over the expected lifetime and service conditions, with respect to long and short term hydraulic compressive creep, water absorption and hydraulic fatigue. Please contact DIAB Technical Services for design proposal.

Mechanical properties Divinycell® HCP

| Property | Test Procedure | Unit | | HCP 30 | HCP50 | HCP70 | HCP90 | HCP100 |
|---------------------------------------|----------------|-------------------|---------|--------|-------|-------|-------|---------|
| Hydraulic Crush Point | | Bar | | 30-39 | 50-59 | 70-79 | 90-99 | 100-109 |
| Compressive Strength ¹ | ASTM D 1621 | MPa | Nominal | 5.4 | 7.2 | 8.1 | 10.2 | 11.6 |
| | | | Minimum | 4.5 | 6.1 | 7.0 | 9.0 | 10.0 |
| E-modulus (extensometer) ¹ | ASTM D1621 | MPa | Nominal | 310 | 400 | 500 | 590 | 650 |
| | | | Minimum | 265 | 350 | 390 | 490 | 540 |
| Tensile Strength ¹ | ASTM D 1623 | MPa | Nominal | 7.1 | 9.2 | 11.0 | 12.6 | 13.5 |
| | | | Minimum | 6.3 | 8.0 | 10.0 | 11.5 | 12.2 |
| Shear Strength | ASTM C 273 | MPa | Nominal | 3.5 | 4.5 | 5.2 | 6.5 | 7.3 |
| | | | Minimum | 3.2 | 3.9 | 4.2 | 6.0 | 6.5 |
| Shear Modulus | ASTM C 273 | MPa | Nominal | 73 | 97 | 115 | 147 | 170 |
| | | | Minimum | 65 | 81 | 90 | 126 | 146 |
| Shear Strain | ASTM C 273 | % | Nominal | 45 | 45 | 35 | 35 | 35 |
| Density | ISO 845 | kg/m ³ | Nominal | 200 | 250 | 300 | 360 | 400 |

All values measured at +23°C

1. Properties measured perpendicular to the plane

Nominal value is an average value of a mechanical property at a nominal density

Minimum value is a minimum guaranteed mechanical property a material has independently of density

Product Characteristics

- Excellent buoyancy performance
- High impact resistance
- Low water absorption
- Thermoformable
- Superior damage tolerance
- Fast and easy to machine
- Good chemical resistance
- High temperature resistance

Technical Characteristics

| Type | Buoyancy (kg/m ³) | Operational depth ¹ (m) | Crush depth (m) |
|--------|-------------------------------|------------------------------------|-----------------|
| HCP30 | 825 | 190 | 300 |
| HCP50 | 775 | 300 | 500 |
| HCP70 | 725 | 450 | 700 |
| HCP90 | 665 | 550 | 900 |
| HCP100 | 625 | 650 | 1000 |

- Operational depth above is calculated with a max 5% buoyancy loss over 10 years operational time.
Depth shown are for guidance only and can be optimized for individual conditions. Always contact DIAB for advice before selecting material.
Buoyancy calculated from salt water (density 1025 kg/m³).

Technical Characteristics Divinycell® HCP

| Characteristics ¹ | Unit | HCP30 | HCP50 | HCP70 | HCP90 | HCP100 | Test method |
|-----------------------------------|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Density variation | % | ± 10 | ± 10 | ± 10 | ± 10 | ± 10 | - |
| Closed cells | % | >99 | >99 | >99 | >99 | >99 | - |
| Thermal conductivity ² | W/(m-K) | 0.049 | 0.051 | 0.057 | 0.058 | 0.060 | EN 12667 |
| Coeff, linear heat expansion | x10 ⁻⁶ /°C | 37 | 37 | 37 | 37 | 37 | ASTM D 696 |
| Continuous temp range | °C | -200 to +80 | -200 to +80 | -200 to +80 | -200 to +80 | -200 to +80 | - |
| Max process temp | °C | +90 | +90 | +90 | +90 | +90 | - |
| Dissipation factor | - | 0.0015 | 0.0020 | 0.0024 | 0.0030 | 0.0034 | ASTM D 2520 |
| Dielectric constant | - | 1.25 | 1.32 | 1.39 | 1.47 | 1.53 | ASTM D 2520 |

- Typical values
- Thermal conductivity at +10°C

Operating temperature is typically -200°C to +80°C. Normally Divinycell HCP can be processed up to +90°C without dimensional changes.

Maximum processing temperature is dependent on time, pressure and process conditions. Therefore users are advised to contact Diab Technical Services to confirm that Divinycell HCP is compatible with their particular processing parameters.

Physical characteristics

| Format | | Unit | HCP30 | HCP50 | HCP70 | HCP90 | HCP100 |
|--------------|-----------|------|-------|-------|-------|-------|--------|
| Plain sheets | Length | mm | 1730 | 1640 | 1410 | 1340 | 1310 |
| | Width | mm | 850 | 800 | 700 | 660 | 640 |
| | Thickness | mm | 56 | 53 | 30 | 27 | 23 |

Can be bonded to larger dimensions upon request.

Disclaimer:

This data sheet may be subject to revision and changes due to development and changes of the material. The data is derived from tests and experience. If not stated as minimum values, the data is average data and should be treated as such. Calculations should be verified by actual tests. The data is furnished without liability for the company and does not constitute a warranty or representation in respect of the material or its use. The company reserves the right to release new data sheets in replacement.

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Issued: Feb 2016 Doc No: HCP Feb 2016 rev13 SI

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