



## ALUMINIUM AS A BUILDING MATERIAL FOR YACHTS

### INTRODUCTION

Why choose an aluminium yacht? We would like to explain to you why Ceelen & Bekker Yachts opted for this superb building material.

### HISTORY

Aluminium is used more and more in the luxury yacht-building segment. Aluminium has many advantages that make it eminently suitable for high-quality, durable ships. It is corrosion-resistant, light and easy to weld, yet retains its strength. It makes for a stronger, sturdier ship with lower maintenance costs.

The first ship with aluminium components was built in 1891 and in 1940 the first ship completely made of aluminium was built, earning the metal its status as a high-quality building material.

Many years of research and metallurgic developments have led to today's high-quality seaworthy aluminium. With the addition of several alloys, aluminium's natural protective oxide layer becomes extra resistant to salt water. The most commonly used aluminium alloys are the 5000 series (with 3% - 4% magnesium) and the 6000 series (with 0.5% - 1.5% magnesium and silicon).

The high level of magnesium in the 5000 series aluminium alloys lends the material traction comparable to that of steel. Ships built with this material can sail for decades without any obvious corrosion or loss of strength. Ceelen & Bekker Yachts uses AL 5083 H321 Marine Grade Aluminium for its Typhoon range.

### ALUMINIUM VERSUS STEEL

Compared to steel, an aluminium hull built to the same standards is 35% - 45% lighter. This means that by using thicker material one can have a stronger ship at the same weight of a steel hull if required.

The extra cost of the use of aluminium – approximately twice that of steel – is not a limiting factor for Ceelen & Bekker Yachts. First of all, the material costs for the hull and superstructure form only a small part of the overall cost price of a ship. Secondly, aluminium is much more corrosion-resistant than steel, which means that the ultimate saving on maintenance is much higher than the initial extra cost of the material.

### ALUMINIUM VERSUS POLYESTER

Of course aluminium is much more expensive and heavier than polyester. Yet in the building methods used by Ceelen & Bekker Yachts aluminium still has the edge: because we produce on a small scale and because aluminium allows us to satisfy customers' special wishes. Above all, the higher price of aluminium more than compensates for the initial costs of the production of a polyester hull and superstructure for the design of the first ship, the matrix, and the plugs for mass production.

With respect to durability, an aluminium ship easily surpasses a polyester ship. Using modern plastics, which easily prevent osmosis of a polyester hull, remains a potential risk, especially in the long term (decades).

# Infosheet no. 1



A less well-known problem with planing polyester ships is “stress cracking”, hairline cracks in the gel coat. These are caused by “slamming”, the continuous, frequent and overenthusiastic exposure of a high-speed polyester ship to high waves or rough seas. The forces on the hull are such that torsion and distortion can lead to hairline cracks in the gel coat.

Another advantage of aluminium is that in the event of a collision the material does not rupture but warp. At low water temperatures especially, aluminium remains pliable while polyester hardens and becomes more brittle, with potentially dangerous consequences upon impact with a hard surface or object.

## SUMMARY

### LIGHT WEIGHT

*Aluminium weighs 3 times less than steel, making an aluminium hull nearly 50% lighter. A lighter ship performs better, meets with less resistance, uses less fuel, requires less engine power and works with lighter propulsion techniques.*

### STRONG AND SAFE

*An aluminium hull is strong and rigid. Although its traction is slightly less than that of steel, the weight-strength ratio is more or less equal. The risk of a punctured hull after a collision is much smaller than with polyester. It makes an aluminium ship safer on large waterways, in coastal areas and on open seas.*

### LONGEVITY

*Aluminium does not corrode. It immediately reacts with oxygen to form an aluminium-oxide layer on the surface that prevents further exposure to oxygen. The normal longevity of an aluminium ship is over 100 years!*

### COMFORTABLE

*An aluminium hull is extremely strong and not susceptible to vibrations, so it counters choppy waves or rough seas for increased comfort.*

### MINIMUM MAINTENANCE

*In principle, an aluminium yacht need not be painted, which means that the cost of building and maintenance can be brought down. Moreover an aluminium body is easy to repair.*

### FLEXIBILITY

*Aluminium is perfect for the construction of custom-made yachts. Adjustments to the ship are even possible during the actual building phase.*

### STABLE VALUE

*Because an aluminium yacht has a longer life it retains its value.*

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