Marine Aids to Navigation

ALMARIN

Contents

The Company

Almarin was founded in 2004 with the aim of providing its customers with solutions in marine Aids to Navigation (AtoN).

Almarin designs and manufactures its own range of buoys, beacons and structures, in addition to representing the leading manufacturers of marine lanterns and monitoring equipment, among other products in this market. In 2008 Almarin became an industrial member of the International Association of Lighthouse Authorities (IALA).

With its home market in Spain and Portugal, Almarin has an international presence with emblematic projects in places like Colombia, where Almarin installed more than one hundred buoys, Panama with various leading line towers and lights, as well as other significant projects in Malta, Mozambique, Cape Verde, Morocco, Uruguay, Brazil, Lebanon, Switzerland, among others.

Backed by Grupo Lindley, whose companies are specialized in coastal and port infrastructure, Almarin offers solutions as a manufacturer of Aids to Navigation recognised for its advances in the design of floating solutions, the quality of its products and its after sales service.

The Grupo Lindley

The Grupo Lindley is a group of companies specialized in port engineering and equipment supply. Its origin dates back to 1930, with the establishment of Ahlers Lindley in Lisbon (Portugal) by a German and an Englishman with Basque origins.

Today the group comprises of four companies: Ahlers Lindley is a manufacturer of floating equipment for marinas and recreational ports; Almovi distributes and services cargo handling equipment; Salt Technologies develops marine engineering and technology; and Almarin is a manufacturer and distributor of marine aids to navigation.

Ahlers Lindley and Almarin pool production capabilities and together with Salt share expertise in the design and manufacture of fixed and floating structures for the marine environment. Almovi has a highly trained team of technicians to provide maintenance to heavy port and industrial machinery. Finally, Salt has an engineering team focused on developing technology for mooring systems, floating structures and Jack-Ups.

The Grupo Lindley companies are focused on providing a competitive advantage to their customers by offering knowledge and experience in design, manufacture and maintenance.

Marina Tróia (Portugal)

Grupo Lindley headquarters in Cascais (Portugal)

Marine Aids to Navigation

Almarin focuses its activity in the design, manufacture, supply and installation of marine aids to navigation. The design of buoys and beacons is carried out by Almarin's in-house engineering team in accordance with Eurocodes and IALA recommendations. This capability allows for designs and solutions to be adjusted to customer's specific requirements.

Almarin also offers specialized services such as buoy mooring systems, structural calculations, tailored lantern houses, traditional or synthetic mooring components, mooring systems for great depths, complete project development in accordance to IALA recommendations.

After sales service is one of Almarin's main strengths. Our staff help customers throughout the complete product lifecycle: from the selection of the most suitable product to installation and maintenance. Experienced technicians can assist customers with regular inspections, repairs and maintenance of their equipment to ensure optimal performance. Almarin works with Port Authorities, regional Governments, recreational ports and clubs, aquacultures and private customers whose intentions are to make their coastal infrastructure safe for navigation.

Buoys

- **Balizamar** — Polyethylene hull
- **Guia** — Elastomer hull
- **Spar** — Surf & breaking waves
- **Articulated** — Reduced swing radius
- **Sub-surface buoyancy** — Mooring Solutions

Towers and Beacons

- **ALT 1** — Pontoons
- **ALT 3** — Ports & harbours Ø 0,5m
- **ALT 5** — Ports & harbours Ø 1,0m
- **ALT 7** — Coastal beacons with internal access
- **ALT 10** — Coastal beacons with internal access
- **ALT 12** — Easy to transport for remote locations
- **ALT 14** — Self-erecting modular towers

Lanterns

- **Self-Contained Lanterns** — 1 to 7 NM
- **Externally Powered Lanterns** — 1 to 22 NM
- **Rotating Beacons** — Up to 22 NM
- **Sector Lights** — Up to 30 NM
- **Leading Lights** — Up to 30 NM
- **360 ° Sector Lights** — Up to 14 NM
- **Lantern Rooms for Lighthouses**

Monitoring and Electronic Navigation

- **Monitoring and Remote Control**. Remote management systems for beaconing, communications via SMS/GPRS/Satellite
- **AIS Type 1 and Type 3. Racon**

Balizamar Buoys

ROTATIONALLY-MOULDED HULL
BALIZAMAR

CHARACTERISTICS AND ADVANTAGES

Strength	Hot dip galvanised steel structure with stainless steel accessories
Safety	Rotationally-moulded hull filled with closed cell EPS foam ensures flotation in case of breached skin
Lantern	Designed to operate with self-contained and small sized lanterns from any manufacturer
Radar reflector	Stainless steel trihedral radar reflector
Day marks	Stainless steel day marks improve the day time visibility and range of the buoy
Top marks	Large top marks ensure the buoy can be identified easily
Stability	Intrinsically stable configuration with a built-in counterweight to ensure stability, even without a mooring
Size	Available in diameters up to 1.6 m, focal plane up to 3.6 m and volumes up to 2.6 m³

APPLICATIONS

- Marking of ports
- Marking the limits of marine concessions
- Beaconing of shallows
- Delimiting of work areas
- Provisional installations
- Mooring buoys
- Marking of dredging pipes

FEATURES

Models	B1250T	B1600S	C1250T	C1600T
Location	Semi-sheltered waters and rivers		Coastal and offshore applications	
Hull volume	0.72 m³	1.23 m³	1.67 m³	2.61 m³
FMR load*	200 kg	450 kg	600 kg	1200 kg
Focal plane	2.00 m	2.24 m	3.56 m	3.62 m

* Recommended Minimum Freeboard (FMR)

QUALITY

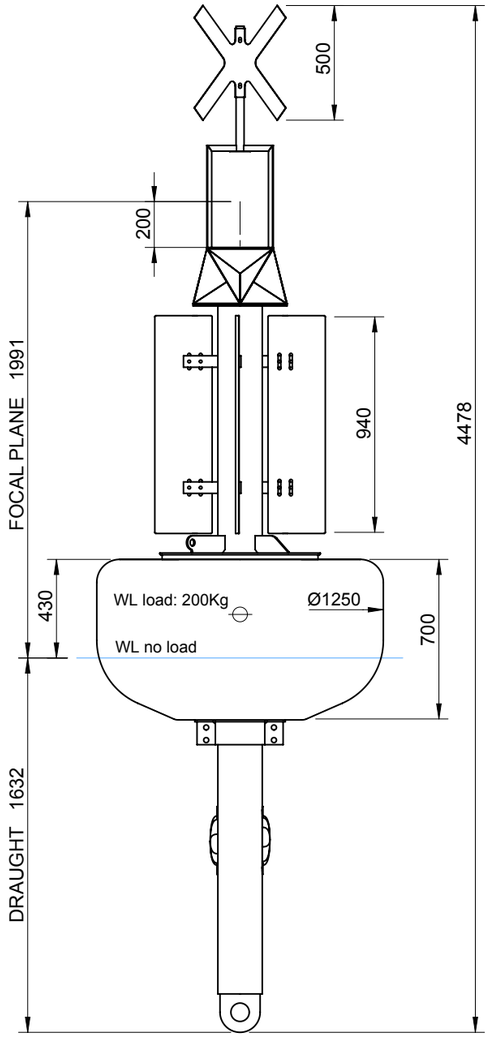
Hull	Rotomoulded medium density pigmented polyethylene with a maximum strength UV inhibitor filled with expanded PS. Water resistant up to 100ºC, resistant to most acids and common solvents
Galvanization	The carbon steel components are hot dip galvanised in accordance with ISO 1460:2010 standard
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Colour	In accordance with IALA E -108
Galvanic Protection	Anodes protect the immersed structure
Recycling	The buoy components are easily recycled with a direct re-use rate nearing 100%
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA Industrial Member

CONSTRUCTION

Hull	Rotomoulded MDPE thyroid filled with expanded polystyrene
Structure	Single tube that passes through the centre of the hull. Mooring eye on its lower side that receives the mooring system and a centre plate that transfers the loads to the float. Manufactured using ST 37 steel and subsequently hot dip galvanised. Painted upper structure
Radar reflector	Trihedral radar reflector with 24 sides and manufactured in stainless steel AISI 304 and painted
Top mark	Stainless steel AISI 304 and painted
Top mark support	Stainless steel AISI 304 and painted
Day marks	Stainless steel AISI 304 and painted
Anodes	Two zinc anodes of 2.5 kg each
Counterweight	Cast iron, 40 kg each located in the lower part of the tail
Screws	Stainless steel A2

BALIZAMAR BUOYS

B1250T

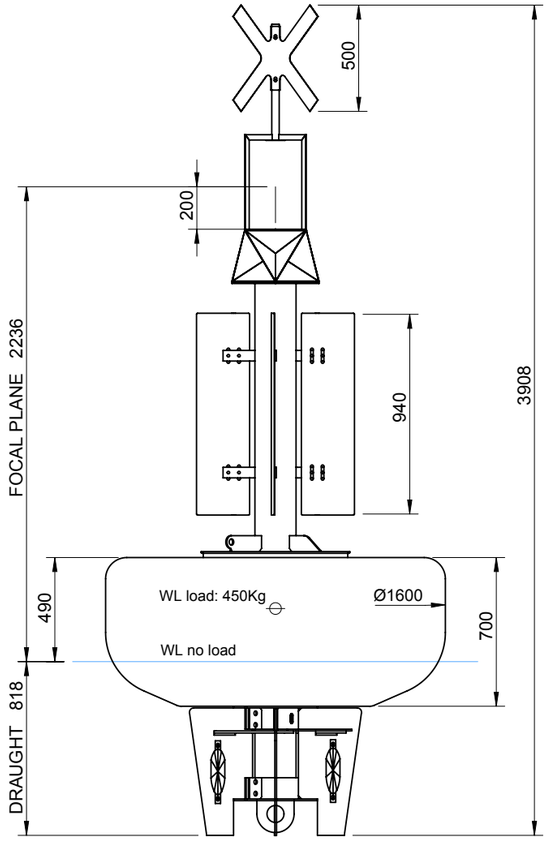


SPECIFICATIONS	
Hull diameter	1.25 m
Hull height	0.70 m
Displacement	10.52 kg/cm
Complete buoy weight	280 kg
Minimum freeboard	0.24 m
FMR load	200 kg
Focal plane	2.00 m
Counterweight	40 kg

* This data is approximate.

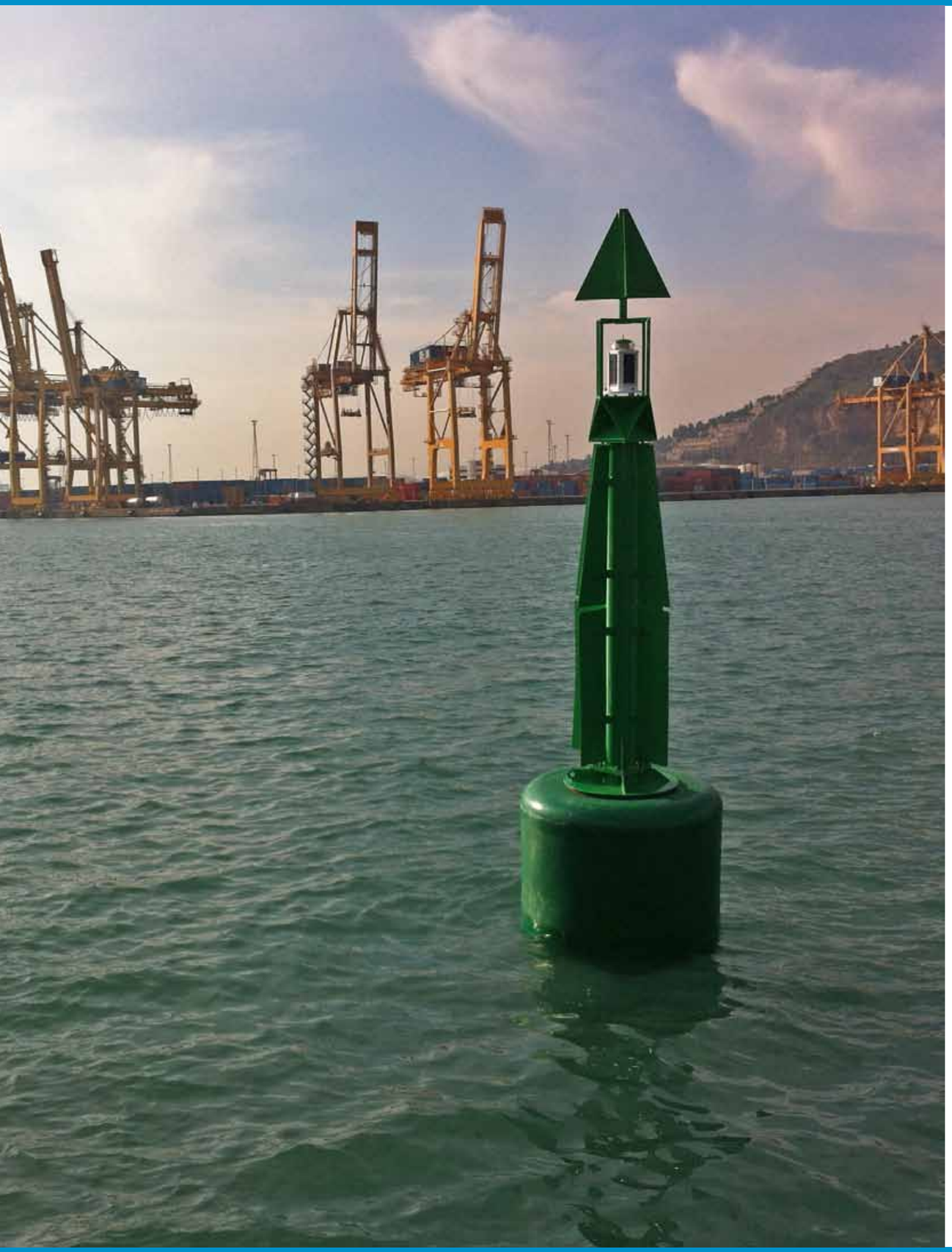
BALIZAMAR BUOYS

B1600S



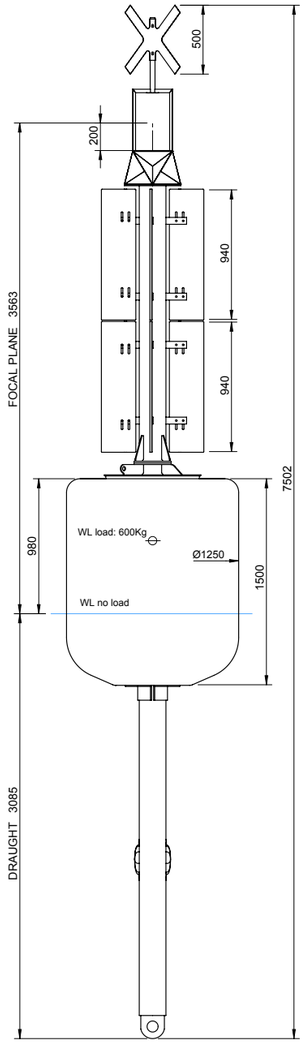
SPECIFICATIONS	
Hull diameter	1.6 m
Hull height	0.70 m
Displacement	17.98 kg/cm
Complete buoy weight	370 kg
Minimum freeboard	0.24 m
FMR load	450 kg
Focal plane	2.24 m
Counterweight	40 kg

* This data is approximate.



BALIZAMAR BUOYS

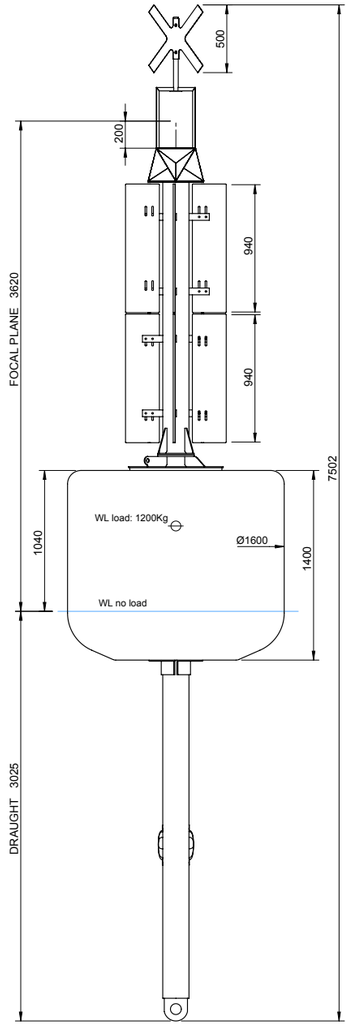
C1250T



SPECIFICATIONS	
Hull diameter	1.25 m
Hull height	1.5 m
Displacement	11.39 kg/cm
Complete buoy weight	595 kg
Minimum freeboard	0.45 m
FMR load	600 kg
Focal plane	3.56 m
Counterweight	80 kg

* This data is approximate.

BALIZAMAR BUOYS
C1600T



SPECIFICATIONS	
Hull diameter	1.60 m
Hull height	1.40 m
Displacement	19.07 kg/cm
Complete buoy weight	685 kg
Minimum freeboard	0.41 m
FMR load	1200 kg
Focal plane	3.62 m
Counterweight	120 kg

* This data is approximate.

Guia Buoys

FOAM ELASTOMER HULL

GUIA

CHARACTERISTICS AND ADVANTAGES

Strength	Hot dip galvanised steel structure with stainless steel accessories
Safety	Polyethylene closed cell foam core with elastomer skin
Lantern	Designed to operate with standalone lanterns or external photovoltaic systems from any manufacturer
Maintenance	High quality materials, stainless or galvanised steel, painted in accordance with C5-M ISO 12944 to ensure a minimum maintenance
Stability	Intrinsically stable configuration with a built-in counterweight to ensure its stability, even without a mooring
Size	Available in diameters up to 3.6 m, focal plane up to 7 m and volumes up to 22 m^3
Superestructure options	• Lattice tower manufactured from galvanised steel • Polygonal tower manufactured from stainless steel, with an integrated work platform

APPLICATIONS

- Access channels for major ports
- Offshore navigation aids
- Oil platforms
- Open sea exclusion areas
- Sewage outfalls
- Tailor-made special structures

FEATURES

Models*	G2200TW2	G2200T3	G2200TL3	G2400T3	G2400TL3	G3000T4	G3000TL4	G3600TW6
Hull volume	4.01 m^3	4.01 m^3	5.47 m^3	4.77 m^3	6.51 m^3	7.34 m^3	10.00 m^3	18.57 m^3
Complete buoy weight	1325 kg	1500 kg	1600 kg	1525 kg	1650 kg	1925 kg	2100 kg	6500 kg
FMR Load**	1400 kg	1225 kg	2133 kg	1718 kg	2793 kg	3058 kg	4726 kg	6233 kg
Focal plane	3.15 m	4.05 m	4.42 m	4.10 m	4.48 m	5.16 m	5.54 m	7.78 m

*All the models are available with W tower
**Minimum recommended freeboard (FMR)

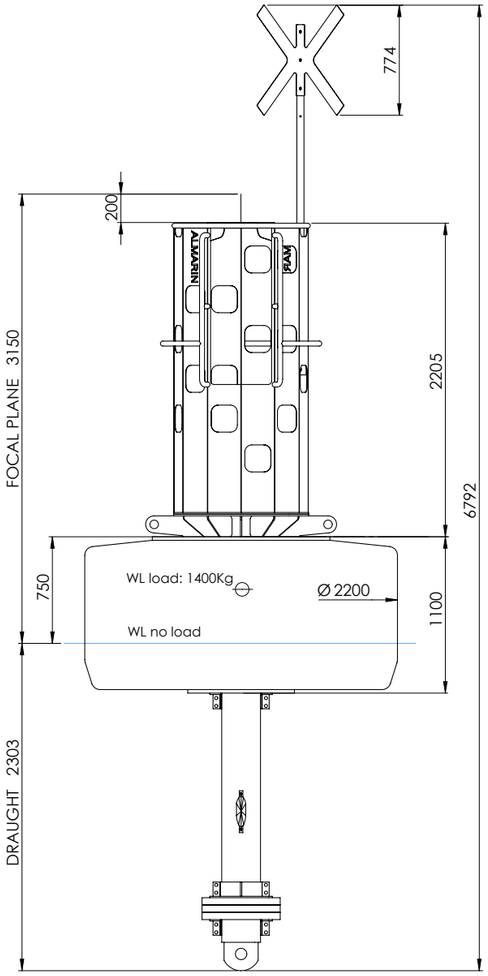
QUALITY

Hull	Closed cell polyethylene foam over a galvanised steel central tube. Outer skin made of pigmented polyurethane elastomer with maximum UV protection and a thickness between 10 to 16 mm. Upper surface painted with a non slip paint
Galvanization	The components manufactured in carbon steel and hot dip galvanised in accordance with ISO 1460:2010 standard
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Colour	In accordance with IALA E -108
Galvanised protection	Anodes protect the immersed structure
Recycling	The buoy components are easily recycled with a direct re-use rate nearing 100%
Manufacture certificate	ISO 9001:2015 and ISO 14001:2015, IALA Industrial Member

CONSTRUCTION

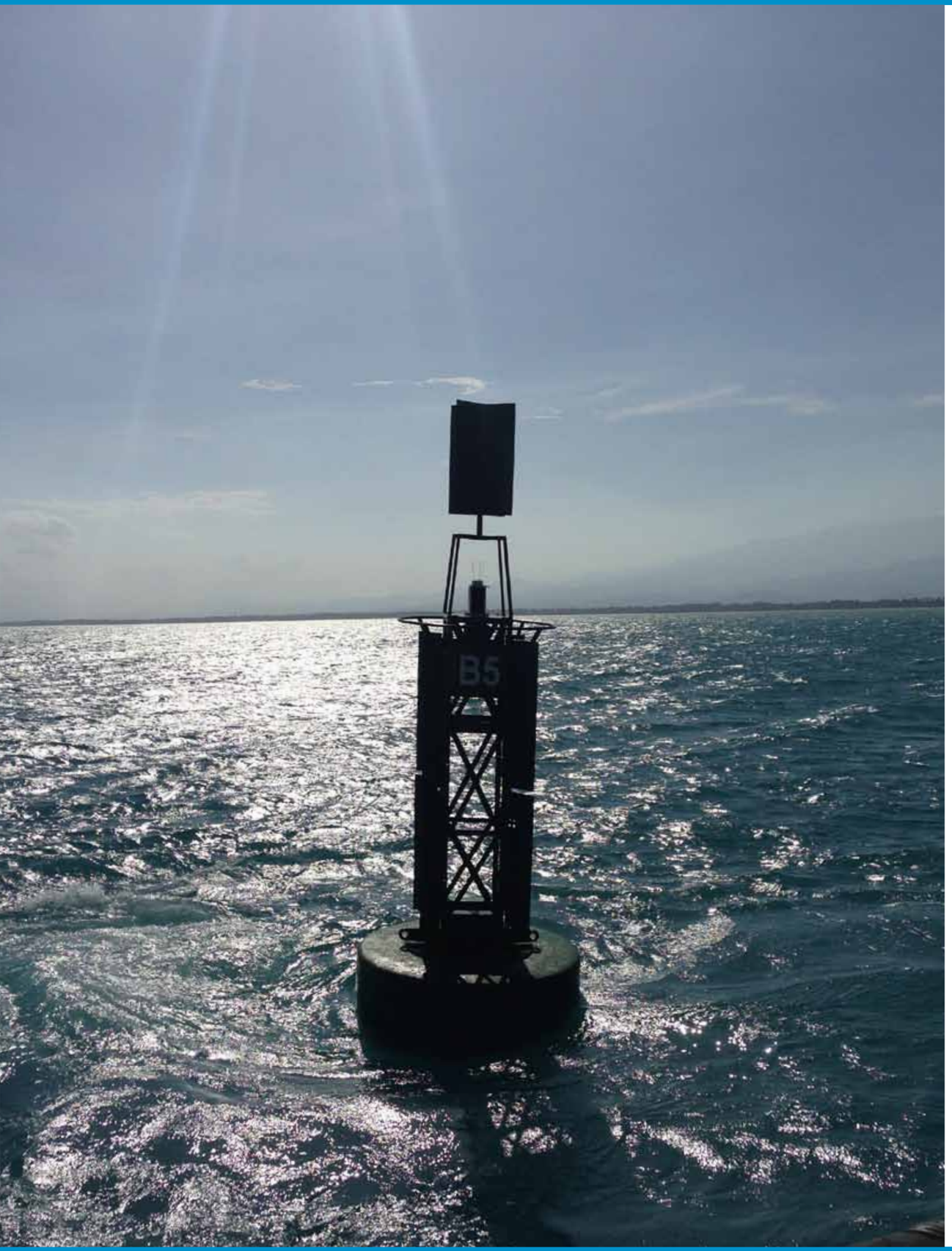
Hull	Foam elastomer hull manufactured using 35- 50 kg/m3 density foam. Elastomer has excellent elastic properties (300% stretch). Energy absorption properties ensure the hull does not crack, even when subjected to strong impacts
Tail	Structure manufactured from galvanised steel. The tail passes vertically through the hull. A mooring eye on the lower end holds the mooring and a large load bearing surface transfers the loads to the hull
Super structure	Lattice tower manufactured from hot dip galvanised steel, with stainlesss steel topmarks and day marks. Includes a safety ring to facilitate lantern maintenance Poligonal W tower manufactured in stainless steel with an internal work platform with GRP mesh flooring Both options prepared to install battery boxes, solar panels and other equipment
Radar reflector	Multi-segmented and passive radar reflector measuring more than 10 m^2 RCS
Counterweight	Cast iron disks 70k g/unit positioned on the lower part of the tail
Screws	Stainless steel A2

GUIA BUOYS
G2200TW2

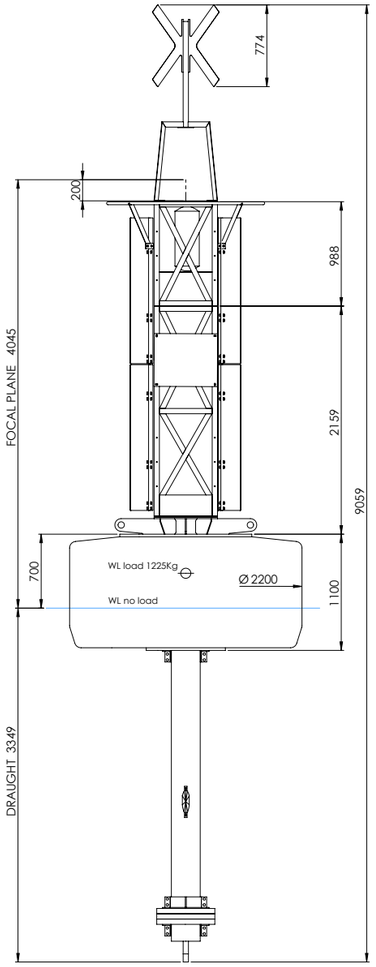


SPECIFICATIONS WITH 2 m TOWER	
Model	G2200TW2
Hull diameter	2.20 m
Hull height	1.10 m
Displacement	37.33 kg/cm
Complete buoy weight	1325 kg
Minimum freeboard	0.37 m
FMR load	1400 kg
Focal plane	3.15 m
Counterweight	210 kg

* This data is approximate.

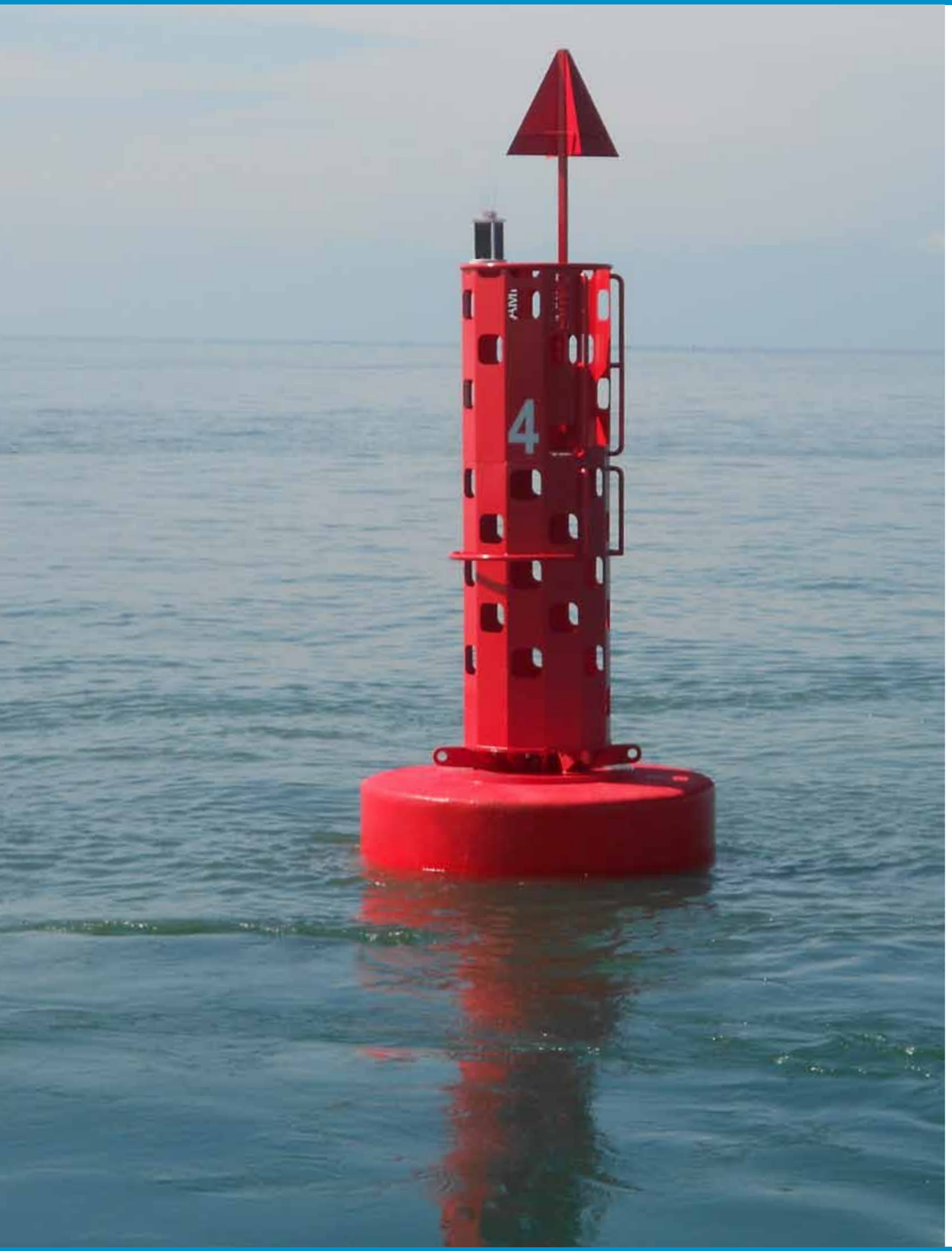


GUIA BUOYS
G2200T3

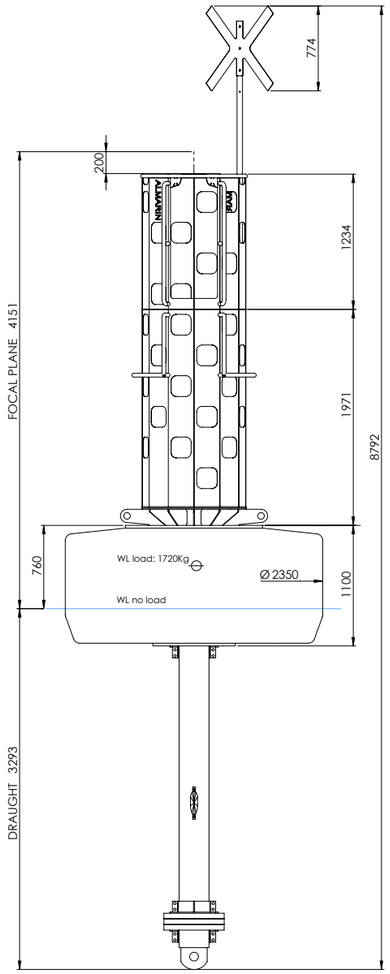


SPECIFICATIONS WITH 3 m TOWER		
Models	G2200T3	G2200TL3
Hull diameter	2.20 m	2.20 m
Hull height	1.10 m	1.50 m
Displacement	37.33 kg/cm	37.33 kg/cm
Complete buoy weight	1500 kg	1600 kg
Minimum freeboard	0.37 m	0.50 m
FMR load	1225 kg	2133 kg
Focal plane	4.05 m	4.42 m
Counterweight	210 kg	210 kg

* This data is approximate.

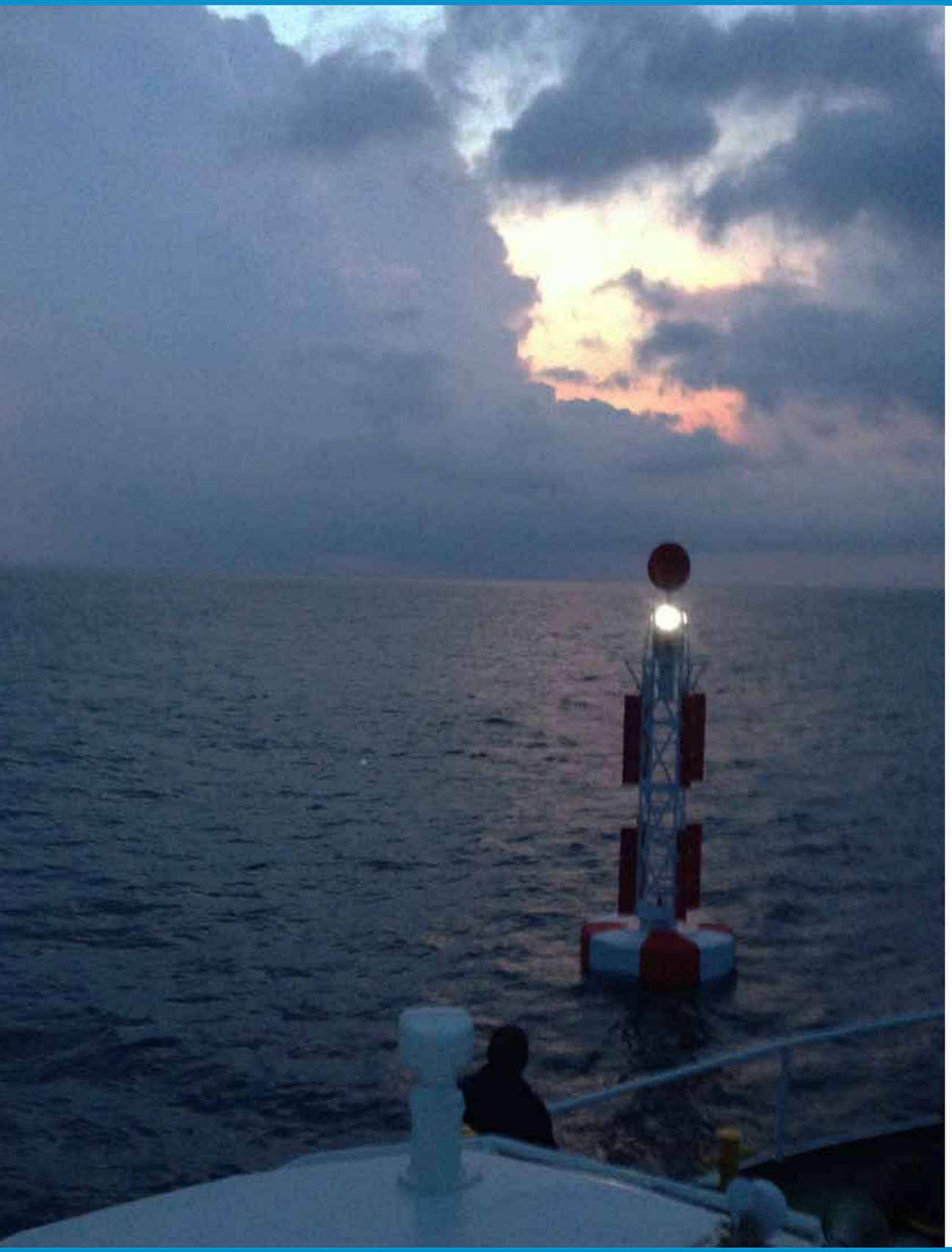


GUIA BUOYS
G2400TW3

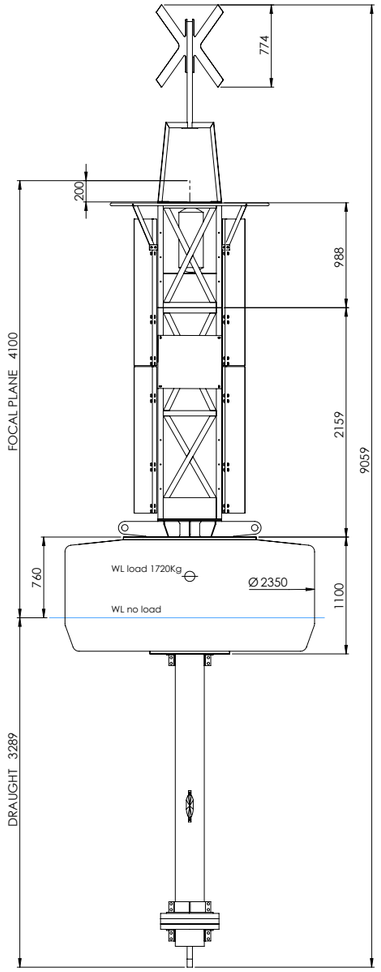


SPECIFICATIONS WITH 3 m TOWER		
Models	G2400TW3	G2400TLW3
Hull diameter	2.40 m	2.40 m
Hull height	1.10 m	1.50 m
Displacement	44.43 kg/cm	44.43 kg/cm
Complete buoy weight	1525 kg	1650 kg
Minimum freeboard	0.37 m	0.50 m
FMR load	1718 kg	2793 kg
Focal plane	4.15 m	4.53 m
Counterweight	210 kg	210 kg

* This data is approximate.



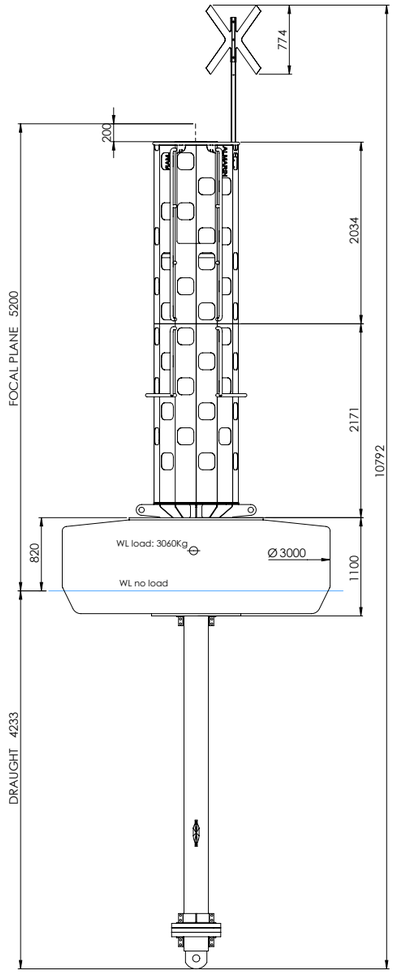
GUIA BUOYS
G2400T3



SPECIFICATIONS WITH 3 m TOWER		
Models	G2400T	G2400TL3
Hull diameter	2.40 m	2.40 m
Hull height	1.10 m	1.50 m
Displacement	44.43 kg/cm	44.43 kg/cm
Complete buoy weight	1525 kg	1650 kg
Minimum freeboard	0.37 m	0.50 m
FMR load	1718 kg	2793 kg
Focal plane	4.12 m	4.49 m
Counterweight	210 kg	210 kg

* This data is approximate.

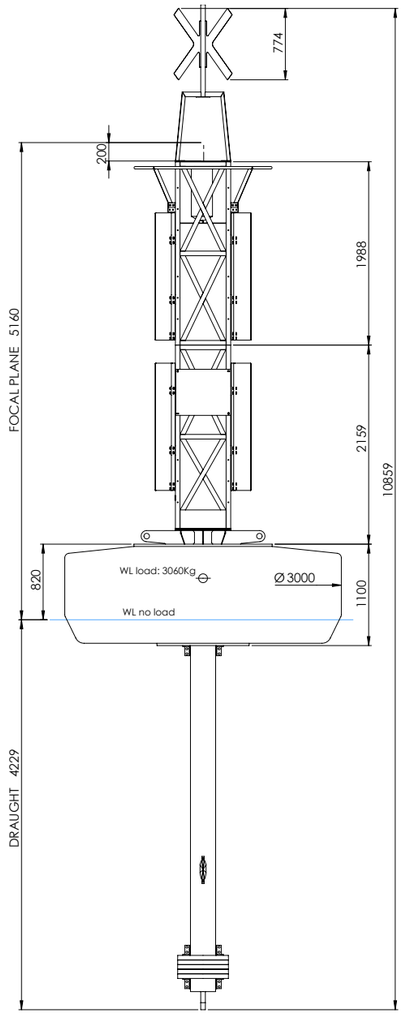
GUIA BUOYS
G3000TW4



SPECIFICATIONS WITH 4m TOWER		
Models	G3000TW4	G3000TLW4
Hull diameter	3.00 m	3.00 m
Hull height	1.10 m	1.50 m
Displacement	68.26 kg/cm	68.26 kg/cm
Complete buoy weight	1925 kg	2100 kg
Minimum freeboard	0.37 m	0.50 m
FMR load	3058 kg	4726 kg
Focal plane	5.20 m	5.58 m
Counterweight	280 kg	280 kg

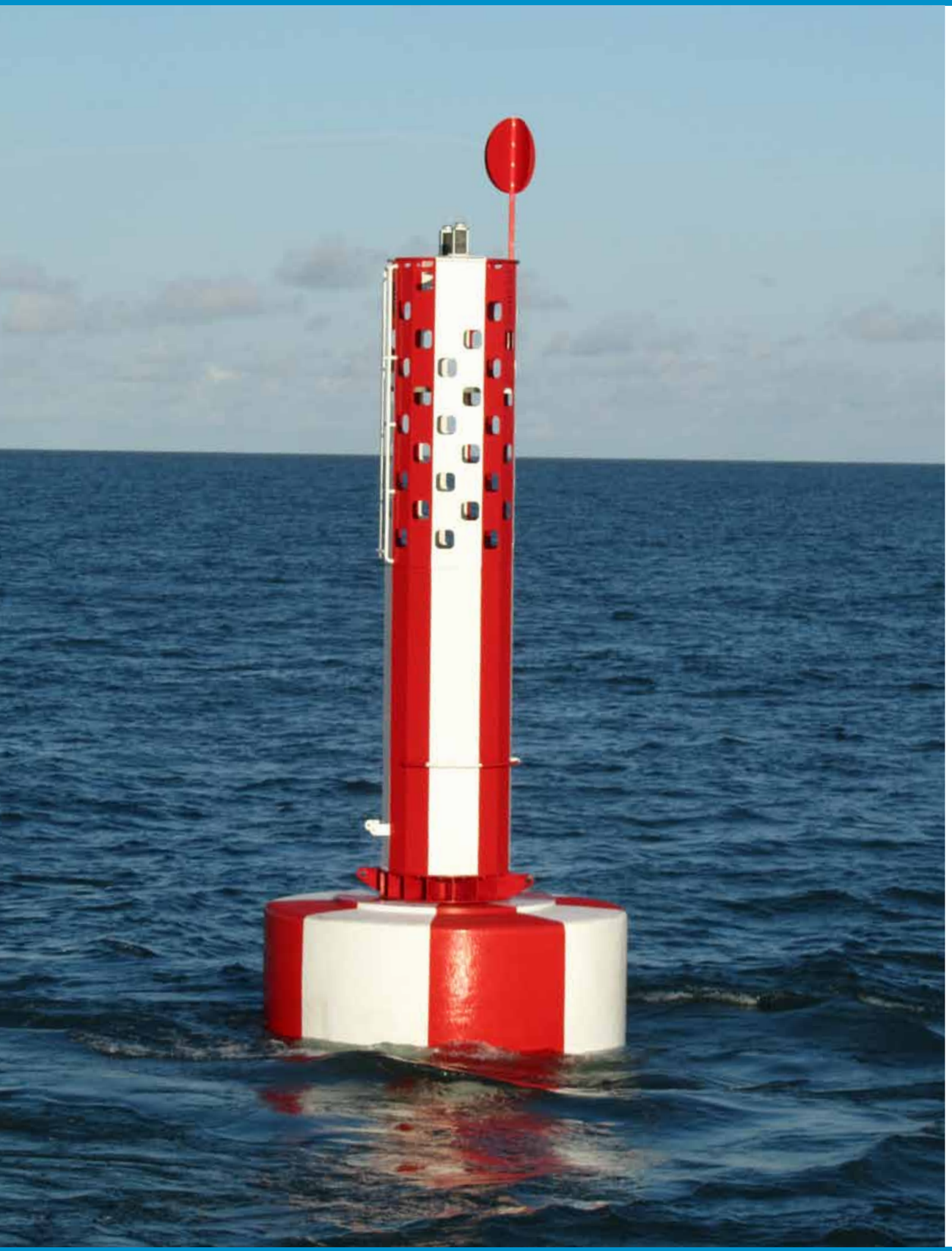
* This data is approximate.

GUIA BUOYS
G3000T4

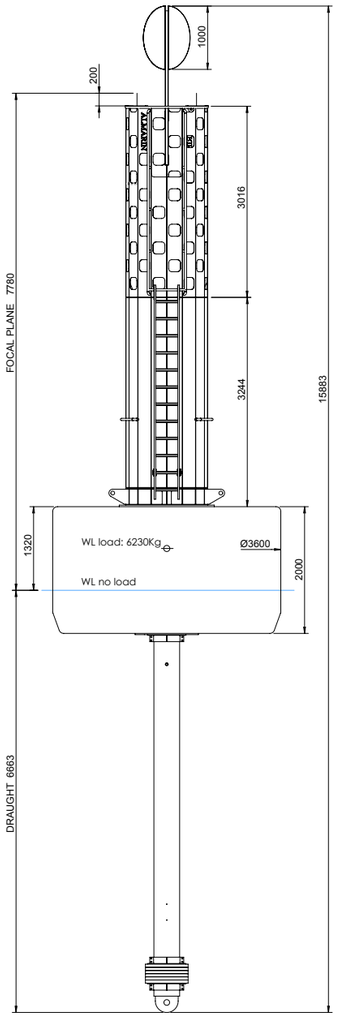


SPECIFICATIONS WITH 4 m TOWER		
Models	G3000T4	G3000TL4
Hull diameter	3.00 m	3.00 m
Hull height	1.10 m	1.50 m
Displacement	68.26 kg/cm	68.26 kg/cm
Complete buoy weight	1925 kg	2100 kg
Minimum freeboard	0.37 m	0.50 m
FMR load	3058 kg	4726 kg
Focal plane	5.16 m	5.54 m
Counterweight	280 kg	280 kg

* This data is approximate.

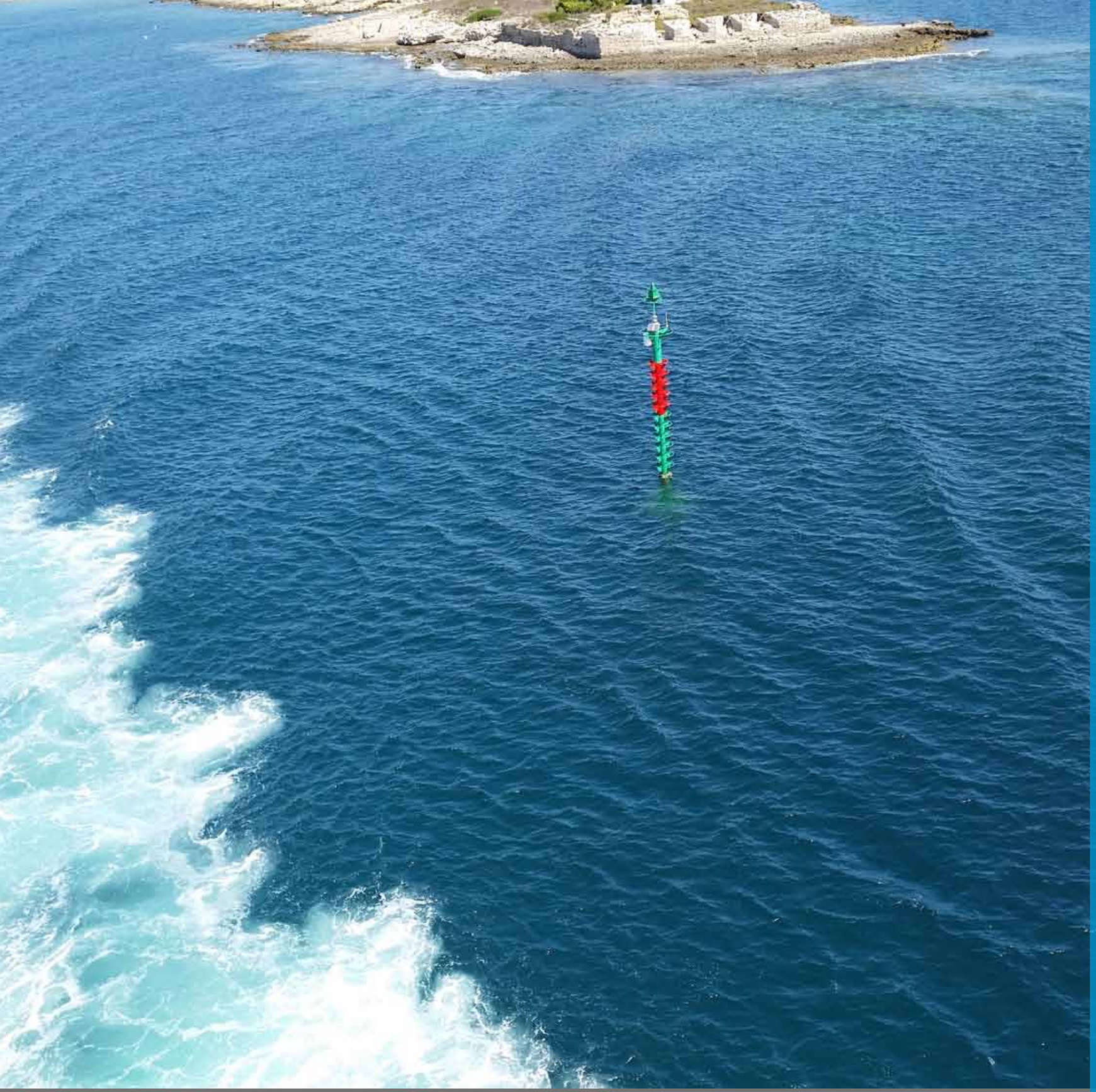


GUIA BUOYS
G3600TW6



SPECIFICATIONS WITH 6 m TOWER	
Models	G3600TW6
Hull diameter	3.60 m
Hull height	2.00 m
Displacement	95.02 kg/cm
Complete buoy weight	6500 kg
Minimum freeboard	0.66 m
FMR load	6233 kg
Focal plane	7.78 m
Counterweight	900 kg

* This data is approximate.



Special Buoys

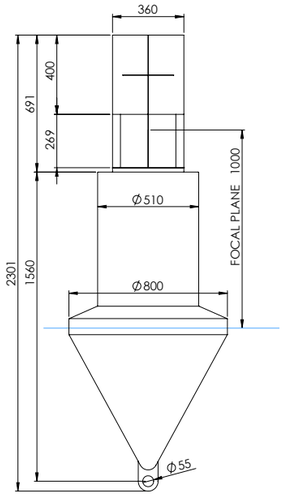
SPECIAL BUOYS
A800

CHARACTERISTICS AND ADVANTAGES

Strength	Mooring eye with metallic reinforcement
Easy to use	13 kg empty (without accessories)
Lantern	Designed to operate with or without a lantern
Top mark	Available as an option for the cylindrical buoy
Stability	Optional internal counterweight to improve stability in case of low mooring load

APPLICATIONS

- Marine works
- Beaches
- Beaconing of minor channels and provisional installations



FEATURES

Models	CYLINDRICAL	CONICAL	SPHERICAL
Hull volume	0.10 m^3	0.10 m^3	0.10 m^3
FMR Load*	49 kg	49 kg	49 kg
Weight when empty	13 kg	13 kg	13 kg
Weight with top mark and 20 kg counterweight	46 kg	N/A	N/A
Diameter	0.80 m	0.80 m	0.80 m

* Minimum recommended freeboard (FMR)

CONSTRUCTION & QUALITY

Hull	Rotomoulded MDPE pigmented and with UV inhibitor. Wall thickness from 5 to 7 mm. Resistant up to 100ºC and resistant to most acids and common solvents
Mooring eye	Polyethylene eye reinforced with a metallic ring
Recycling	The buoy components are easily recycled, with a direct re-use rate nearing 100%
Access to the interior	Removable screw for filling with counterweight material and/or PU foam

OPTIONS

Top mark	Available for the cylindrical buoy, manufactured in AISI 314 steel and painted
PU foam filling	Expanded PU foam filling to ensure flotation in case of breached hull
Sand counterweight	Aids stability in case of a low mooring load. PU foam filling is also required
Radar reflector	Available for a cylindrical buoy with top mark
Lantern	Self-contained lantern of up to 3 NM

SPECIAL BUOYS

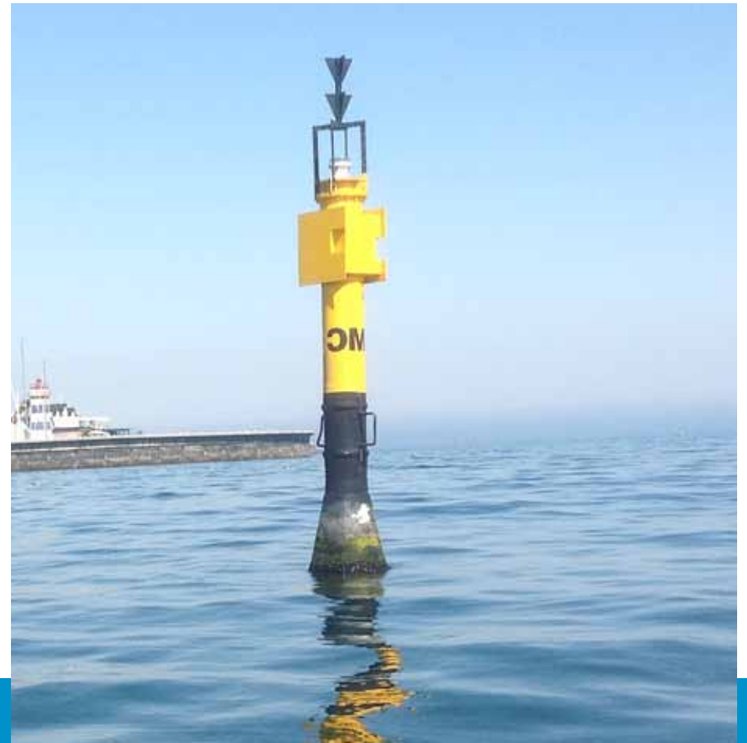
SPAR BEACONS

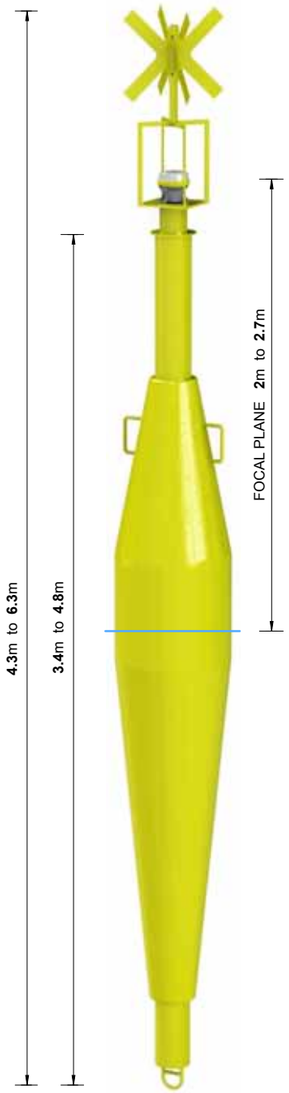
CHARACTERISTICS AND ADVANTAGES

Strength	Manufactured in GRP, with a galvanised steel mooring eye and designed for operating in extreme sea conditions
Safety	Watertight internal compartment partially filled with EPS
Lantern	Designed to operate with standalone lanterns of any manufacturer
Radar reflector	Integrated in the interior of the buoy
Top mark	Manufactured in aluminium and painted

APPLICATIONS

- Locations with breaking waves (surf)





FEATURES

Models	ALBP 3	ALBP 6
Hull length	3.40 m	4.80 m
Application	Breaking waters	Breaking waters
Minimum depth	3.00 m	6.00 m
Net buoyancy (without a counterweight)	380 kg	425 kg
Weight	200 kg	300 kg
Top mark	Yes	Yes
Focal plane	2.00 m	3.00 m
Radar reflector	Optional	Optional

CONSTRUCTION & QUALITY

Structure and hull	Torpeedo shaped and manufactured in glass reinforced polyester (GRP) with galvanised steel mooring eyes on lower end and sides. A flange is available at its top part for fastening the watertight cover, lantern, etc.
Top mark	Manufactured in aluminium designed to break off in the most extreme conditions
Interior	PVC tube with internal compartment filled with EPS cilinders, radar reflector or other optional equipment Side section - Closed cell polyethylene foam encased in GRP
Paint	Pigmented polyester paint
Colours	In accordance with IALA E -108

SPECIAL BUOYS

ARTICULATED BEACONS

CHARACTERISTICS AND ADVANTAGES

Strength	Steel structure manufactured in sealed segments
Safety	Rotomoulded polyethylene hull filled with expanded polyurethane
Lantern	Designed to operate with standalone lanterns or external photovoltaic systems
Focal plane	Possibility of high focal planes depending on depths
Accuracy	Swing radius of a few metres
Stability	Remains vertical in moderate wave conditions

APPLICATIONS

- Narrow channels, inside of ports
- Marking of dredging limits
- Exterior seawall limits
- Seawalls or submerged obstacles

FEATURES

Models	ALBA 5	ALBA 3
Hull volume	5.00 m^3	3.00 m^3
Minimum depth	12.00 m	8.00 m
Maximum depth	60.00 m	25.00 m
Work platform	Optional	No
Lantern	Any	Self-contained assembly
Radar reflector	Included	Included
Top mark	Included	Included

CONSTRUCTION & QUALITY

Structure and hull	Segmented tube that passes through the centre of the hull. Each segment is sealed. A mooring eye is provided at the lower end to moor the structure directly to the sinker using a shackle Rotomoulded polyethylene hull filled with expanded polyurethane. The hull is divided into segments so that it can be assembled to the tube
Anodes	Multiple anodes along the structure (total number according to the length of the tube)
Paint	All metalic components are treated according to the scheme recommended by ISO 12944 for marine environments. C5-M class for the emersed components and C5-I class for the immersed components
Colours	In accordance with IALA E -108
Recycling	The buoy components are easily recycled with a direct re-use rate nearing 100%

Beacons and Towers

BEACONS
ALT 1

CHARACTERISTICS AND ADVANTAGES

Resistance to corrosion	Manufactured using stainless steel
Application	Used together with blue lights to mark the end of pontoons in the interior of ports. Not suitable as a day mark
Lantern	Designed to operate with M550 lantern
Finish	Polished stainless steel
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- Marking of pontoons and piers in reacreational ports
- Floating pontoons

FEATURES

Height	From 1 to 2 m
Lantern bracket	Prepared for M550 lantern
Anchor bolts	2no. M12 stainless steel bolts
Service life	50 years

CONSTRUCTION & QUALITY

Structure	Constructed from 60 mm stainless steel tube. Steel slide in the upper side for M550 lanterns. Base in the lower side to anchor to the floor
Material	AISI304 or 316 steel
Screws	A2 stainless steel
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

OPTIONS

Finish	Painted to suit customer requirements
Lantern bracket	Manufactured according to customer needs
Anchors	According to location

BEACONS
ALT 3

CHARACTERISTICS AND ADVANTAGES

Strength	Calculated to withstand 200 km/h winds
Resistence to corrosion	Hot dip galvanised in accordance with ISO1460 or in stainless steel
Paint	Customised scheme according to customer requirements
Lantern	Designed to operate with lanterns from any manufacturer
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- Beacons inside ports
- Beacons for channels and rivers
- Beacons exposed to bad weather
- Beaconing of breakwaters and docks at recreational ports

FEATURES

Height	From 2 m to 4 m
Lantern bracket	3no. M14 mm holes on a 200mm PCD
Anchor bolts	Base plated designed for 12no. M12 bolts, in most applications 6no. anchor bolts are sufficient
Service life	Galvanised steel beacons: 25 years Stainless steel beacons: 50 years

CONSTRUCTION & QUALITY

Structure	Constructed of 4mm sheet steel and folded to a polygon with 20 sides. Diameter of 500 mm
Material	S275JR hot dip galvanised steel according to ISO 1460:2010
Screws	A2 stainless steel
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

OPTIONS

Material	Stainless steel or GRP*
Ladder	Jack ladder with guards above 3 m
Door	400 x 400 mm door located on the lower part to store battery and charger
Solar panel	Solar panel support bracket
Radar reflector	Trihedral radar reflector manufactured in AISI304 stainless steel and painted
Top mark	Stainless steel top mark
HD version	Sized to receive wave impact

*GRP version has a lower structural strength.

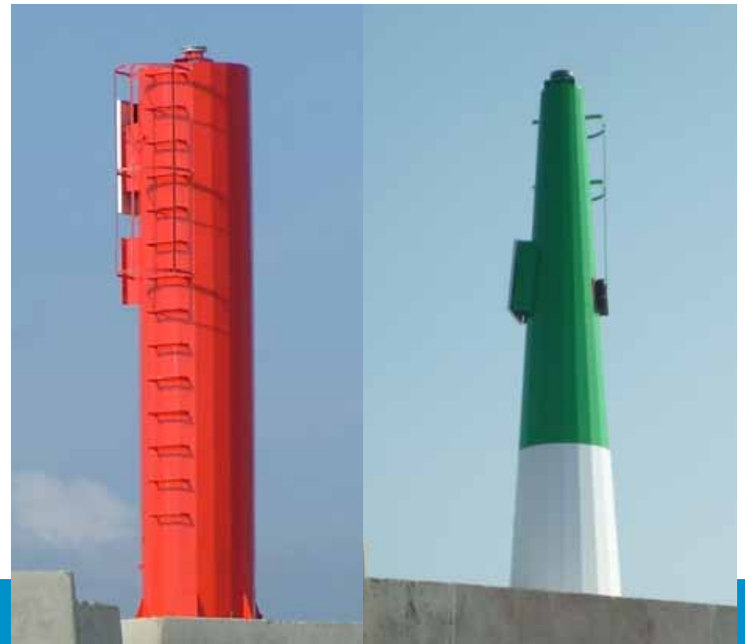
BEACONS
ALT 5

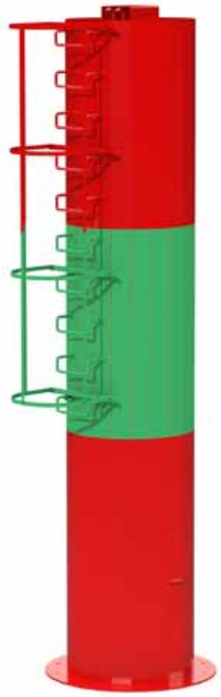
CHARACTERISTICS AND ADVANTAGES

Strength	Calculated to withstand 200 km/h winds
Resistance to corrosion	Hot dip galvanised in accordance with ISO1460
Paint	Customised scheme according to the requirements of the customer
Lantern	Designed to operate with lanterns from any manufacturer
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- Coastal beacons
- Beacons inside commercial ports
- Main beacons at secondary ports
- Beacons exposed to bad weather





FEATURES

Height	Up to 8 m
Lantern bracket	3no. M14 mm holes on a 200mm PCD
Anchor bolts	Base plated designed for 10no. M16 anchor bolts
Service life	Galvanised steel beacons: 25 years Stainless steel beacons: 50 years

CONSTRUCTION & QUALITY

Structure	Constructed of 4mm sheet steel and folded to a polygon with 20 sides. Diameter of 1000 mm
Material	S275JR hot dip galvanised steel
Screws	A2 stainless steel
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

OPTIONS

Material	Stainless steel or GRP*
Ladder	Jack ladder with guards above 3 m
Door	400 x 400 mm door located on the lower part to store battery and charger
Solar panel	Solar panel support bracket located at the top of the beacon
Radar reflector	Trihedral radar reflector manufactured in AISI304 stainless steel and painted
Top mark	Stainless steel top mark
HD version	Sized to receive wave impact

*GRP version has a lower structural strength.

TOWERS
ALT 6

CHARACTERISTICS AND ADVANTAGES

Strength	Calculated to withstand 200 km/h winds
Resistance to corrosion	Hot dip galvanised in accordance with ISO1460 and painted to C5-M
Paint	Customised scheme according to customer requirements
Lantern	Designed to operate with sector lights
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- Day mark support structures
- Structures for leading lights
- Structures for sector lights
- Coastal beaconing

FEATURES

Height	Up to 50 m
Lantern bracket	Designed to customer requirements
Anchor bolts	Tailored anchor bolts according to the application
Service life	25 years

CONSTRUCTION & QUALITY

Structure	Triangular crossection lattice structure manufactured in galvanised steel. Modular structure to facilitate transport and installation
Material	S275JR hot dip galvanised steel according to 1460:2010 ISO
Screws	A2 stainless steel
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Ladder	Internal ladder with lifeline
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

OPTIONS

Daymark	Stainless steel and painted according to IALA recommendations
External platform	Rectangular 2 x 2 m or circular platfom with a diameter of 3 m
Solar panel	Solar panel support bracket located at the top of the beacon

TOWERS
ALT 7

CHARACTERISTICS AND ADVANTAGES

Strength	Calculated to withstand 200 km/h winds
Resistance to corrosion	Hot dip galvanised in accordance with ISO1460 and painted to C5-M, stainless steel option
Paint	Customised scheme according to customer requirements
Lantern	Designed to operate with lanterns from any manufacturer
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards
Safety	• Maintenance platform with man hatch accessible via internal ladder • Door on ground manufactured from steel with dual padlock

APPLICATIONS

- Coastal beaconing
- Harbour entrance
- Commercial ports
- Beacons exposed to waves

FEATURES

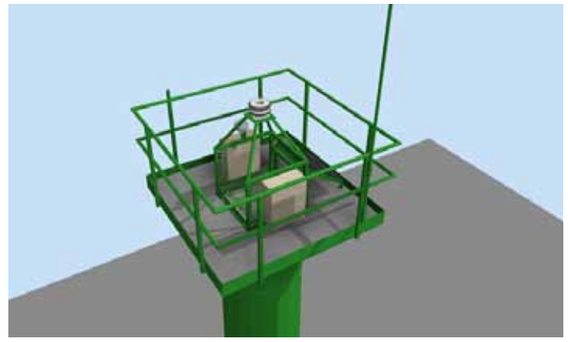
Height	Up to 45 m
Lantern bracket	Designed to customer requirements
Anchor bolts	Tailored anchor bolts according to the application
Service life	Galvanised steel: 25 years Stainless steel: 50 years

CONSTRUCTION & QUALITY

Structure	Constructed using sheet steel and folded to a polygon with 20 sides. Diameter and plate thickness to suit aplication
Material	S275JR hot dip galvanised steel according to 1460:2010 ISO
Screws	A2 stainless steel
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Ladder	Internal ladder with lifeline
Recycling	The components are easily recycled with a direct re-use rate nearing 100%
Door	Vertical double door hinge of 1300 x 650 mm with sealing joint
Platform	Internal work platform has the same diameter as the top section of the tower and is accessed via a hatch

OPTIONS

Material	Stainless steel
Modular	Segmented tower in sections to limit the weight
External platform	Rectangular 2 x 2 m or circular platform with a diameter of 3 m
Solar panel	Solar panel support bracket located at the top of the beacon
Storage	Supports in the base to store batteries, boxes, etc.



TOWERS
ALT 10

CHARACTERISTICS AND ADVANTAGES

Strength	Calculated to withstand 200 km/h winds
Resistance to corrosion	Hot dip galvanised in accordance with ISO1460 and painted to C5-M
Paint	Customised scheme according to the customer requirements
Lantern	Designed to operate with lanterns from any manufacturer
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- Lighthouses and coastal beaconing
- Main beacons at commercial ports
- Beacons exposed to bad weather

FEATURES

Height	Up to 20 m
Lantern supporting bracket	Designed to customer requirements
Anchor bolts	Tailored anchor bolts according to the application
Service life	Galvanised steel: 25 years Stainless steel: 50 years

CONSTRUCTION & QUALITY

Structure	Constructed from steel sheet rolled to a cylinder or cone. Intermediate diameter 1050 mm, base 2100 mm and upper part 2100 mm. Thickness according to loads, heights and local conditions
Material	Hot dip galvanised steel according to 1460:2010 ISO
Screws	A2 stainless steel
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Ladder	Internal ladder with lifeline
Recycling	The components are easily recycled with a direct re-use rate nearing 100%
Door	Vertical double door hinge of 1300 x 650 mm with sealing joint
Platform	1800 mm floor diameter with gradient to the outside and outward discharging drains. Internal hatch and handrail

OPTIONS

Material	Stainless steel
Solar panel	Solar panel support bracket located at the top of the beacon
Storage	Supports in the base to store batteries, boxes, etc.

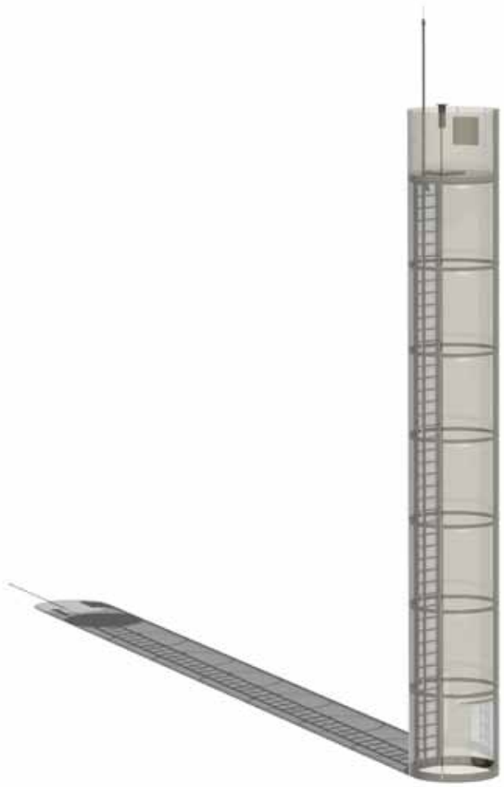
COMPOSITE TOWERS
ALT 12

CHARACTERISTICS AND ADVANTAGES

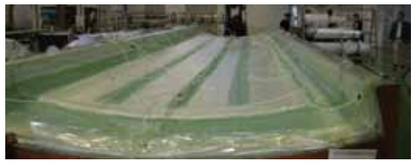
Resistance to corrosion	Manufactured in GRP
Weight	Low weight panels to facilitate transport and installation
Coating	Gelcoat with maximum UV resistance
Lantern	Designed to operate with lanterns from any manufacturer
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

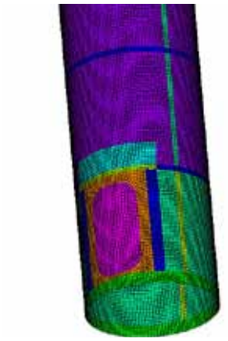
- Structures for remote locations and difficult access
- Coastal beaconing
- Main beacons at principal ports



Section of sandwich panel.



Resin infusion process by vacuum sucking resin into a dry fiber laminate in a single-sided mold.



FEATURES

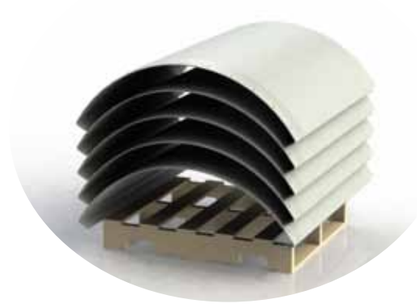
Height	Up to 16 m
Lantern bracket	Designed to customer requirements
Anchor bolts	Tailored anchor bolts according to the application
Service life	30 years

CONSTRUCTION & QUALITY

Structure	Modular cylindrical tower 1600mm diameter. Panels are bolted together with stainless connections
Material	Panels manufactured from epoxy infused fiberglass reinforced laminated skins with a foam core using vaccum
Screws	A2 stainless steel
Paint	SD Topclear 1533 gelcoat with UV treatment to delay aging, pigmented to required colour
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Ladder	Internal aluminium ladder with lifeline
Door	Vertical double door hinge with sealing joint
Platform	1600 mm floor diameter, gradient to the outside. Internal hatch and handrail

OPTIONS

Accessories	Solar panel support bracket located at the top of the beacon, Racon support, top mark, radar reflector
Storage	Supports in the base to store batteries, boxes, etc.



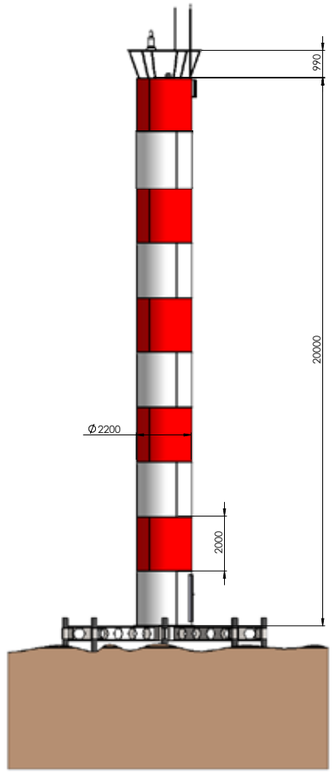
MODULAR TOWERS
ALT 14

CHARACTERISTICS AND ADVANTAGES

Strength	Custom designed to withstand local weather conditions, concept designed for tropical storms
Self-propelled	Modular structure with an integrated internal crane
Resistance to corrosion	Manufactured in stainless steel
Paint	Customised scheme according to customer requirements
Lantern	Designed to operate with lanterns from any manufacturer
Colours	In accordance with IALA E108 recommendations
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- Lighthouses and marking of remote areas
- Robust structures for locations with difficult access



FEATURES

Height	Up to 20 m
Lantern bracket	Designed to customer requirements
Anchor bolts	Tailored anchor bolts according to the application
Service life	50 years

CONSTRUCTION & QUALITY

Structure	Constructed from stainless steel sheet metal in cylindrical or prismatic shape. Nominal diameter 2200 mm. Thickness according to loads, heights and local conditions
Material	AISI 316 steel
Screws	A4 stainless steel
Paint	Visible metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Colours	According to IALA E-108
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Ladder	Internal ladder with lifeline
Recycling	The components are easily recycled with a direct re-use rate nearing 100%
Door	Vertical double door hinge with sealing joint
Upper covered platform	2 m floor diameter, gradient to the outside, outward discharging drains. Internal support for lantern. Covered with a roof which protects the upper platform. The roof which is accessible via a ladder and hatch can carry up to 250 kg of equipment: light beacons, electronic navigation systems as AIS or RACON, solar panels or wind turbines, telecommunications antennas, cameras or coastal surveillance radars
Assembly crane	Internal crane allows for erection of the tower without the aid of external lifting means

OPTIONS

Anchoring systems	Optional metallic and piloted foundations to the use of concrete foundations
Storage	Internal shelving and storage housings

Lantern Rooms

LANTERN DOME FOR LIGHTHOUSES

LANTERN ROOMS

Lantern rooms manufactured by Almarin have been designed for long service life using modern materials and technologies whilst maintaining a classic look.

This range is composed by three basic configurations based on the shape of the glass panels: rectangular, triangular and rhomboidal.

Glass panels are manufactured using the float process, curved using custom moulds and then tempered. The glass panels fit into screwed housings and are sealed into place using high quality sealants. Replacing glass panels is possible by removing the screwed fairings and cutting away the old sealant.

It is possible to manufacture lantern rooms in modules with a limited weight to facilitate transport and installation.

CHARACTERISTICS AND ADVANTAGES

Strength	Designs are verified using finite element structural analysis in accordance with Eurocode 1 and the location
Resistance to corrosion	Stainless steel structure
Design	Various standard designs available
Installation	Modular design to facilitate transport and installation
Flexibility	Customised design according to the requirements of the location
Quality	According to ISO 9001, ISO 14001 standards

APPLICATIONS

- New lighthouse construction
- Renewal of historical lighthouses
- Ligthouses with rotating beacons

FEATURES

Temperature	From -40ºC to +80ºC
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Service life	Galvanised steel: 25 years Stainless steel: 50 years

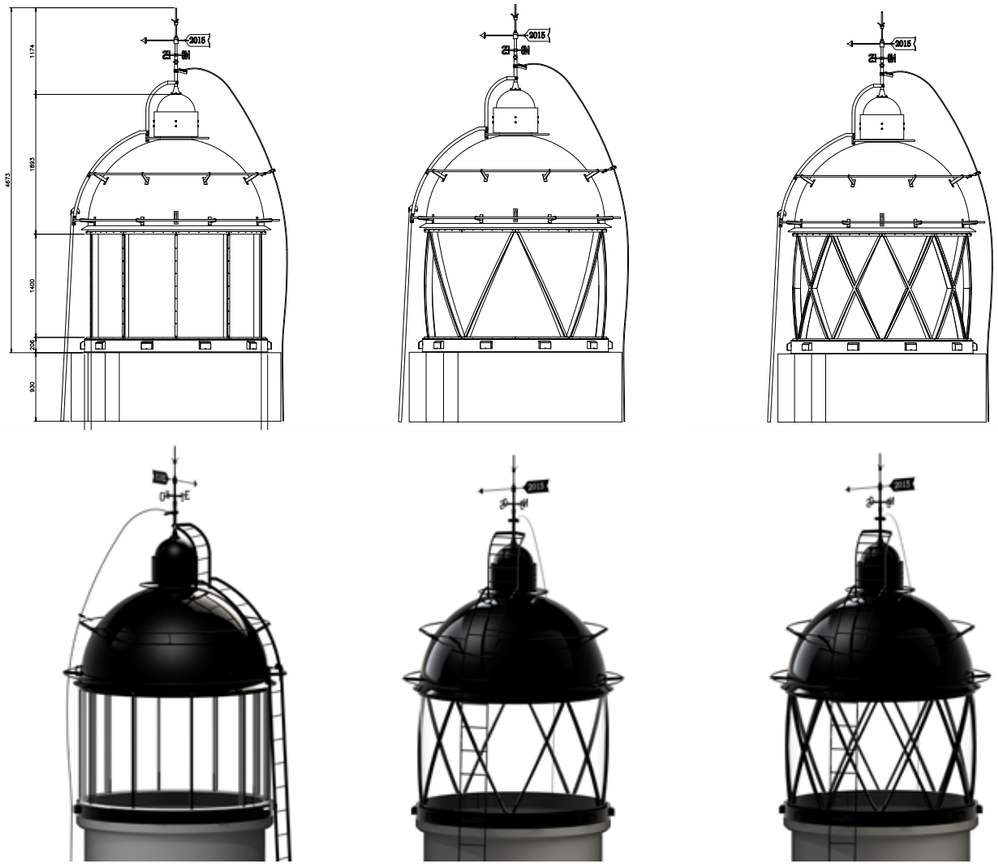
OPTIONS

Material	Galvanised steel
Models	Vertical columns - Rectangular glass panels Diagonal columns - Triangular glass panels Rhomboidal columns - Rhomboidal glass panels
Others	Modular construction to limit weight Steel pedestal Access door to outside platform

CONSTRUCTION & QUALITY

Structure	Upper dome with breathing vents, wind vane and lightning conductor attachment point. Main dome with handrail and optional ladder access. Internal drip tray. Columns with removable fairings allow for the replacement of glass panels. Lower frame with vents
Fixing	Stainless steel anchor bolts
Material	Stainless steel structure Curved, tempered glass Elastomer sealent
Paint	Metal components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	Eurocodes 1 and 3
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

RECTANGULAR | **TRIANGULAR** | **RHOMBOIDAL**



Marking of Structures

MARKING OF STRUCTURES

SUSPENDED LIGHT SUPPORTS

CHARACTERISTICS AND ADVANTAGES

Design	In compliance with O-113 IALA recommendation
Lantern	Self-contained or wired
Installation	Designed to be adapted to the existing structure
Flexibility	• 360º rotation of the support • Vertical custom-made displacement (z) • Horizontal custom-made displacement (x)

FEATURES

Sizes*	Vertical up to 4 m Horizontal up to 2 m
Lantern bracket	Three M12 mm holes over a diameter of 200 mm
Anchor bolts	Designed to suit aplication
Service life	Galvanised steel: 25 years Stainless steel: 50 years

*Approximate sizes subject to study according to location

CONSTRUCTION & QUALITY

Structure	Constructed from tubular section with circular flange to allow fixing in the azimuth required
Material	S275JR steel
Screws	A2 stainless steel
Paint	Metalic components are painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

OPTIONS

Light Version	Manufactured in aluminium to limit weight
Modular	The structure can be manufactured in a modular way to limit the weight of each component

APPLICATIONS

- Marking of fixed bridges
- Marking of other structures above waterways

MARKING OF STRUCTURES

DAY MARKS

CHARACTERISTICS AND ADVANTAGES

Resistance to corrosion	Stainless steel panel painted according to C5-M
Size	Dimensions and proportions in conformity with IALA Guideline 1023
Installation	Modular construction to facilitate installation
Colours	Following IALA recommendations
Quality	In accordance with ISO 9001, ISO 14001 standards
Flexibility	Can be adapted to existing structures

APPLICATIONS

- Leading lights
- Day marks

FEATURES

Sizes	Dimensioned according to IALA Guideline 1023
Anchor bolts	Designed to suit application
Service life	Galvanised steel: 25 years Stainless steel: 50 years

CONSTRUCTION & QUALITY

Material	Stainless steel panel Flanges and support structure in hot dip galvanised steel
Paint	Panel visible surface painted to C5-M according to ISO 12944 for marine environments, using an epoxy primer scheme and aliphatic polyurethane top coat
Standards	According to IALA recommendations
Colours	IALA Aids to Navigation Guide (Navguide), IALA E-108 for colours in the surface used in visual aids to navigation
Manufacturer certificate	ISO 9001:2015, ISO14001:2015, IALA industrial member
Recycling	The components are easily recycled with a direct re-use rate nearing 100%

OPTIONS

Modular	Modular construction to facilitate transport and installation
Perforated panel	Fenced panel reduce wind loading

Quality and Engineering

Quality & Environment

The quality control of manufactured products is an unconditional priority at Almarin. The company strictly monitors the quality of its workmanship and raw materials used. Traceability is of critical importance so as to be able to assess performance throughout the life span of the product.

Due to its commitment with quality and the environment, Almarin is certified with ISO 9001:20015 and ISO 14001:2015. These quality systems promote a constant improvement of the company's products by planing design review procedures and periods.

Since 2008, Almarin is a member of the International Association of Lighthouse Accessories (IALA). This entity provides guidelines and recomendations for the design of aids to navigation; Almarin incorporates the majority of the association's recommendations into the design of its products.


SGS

Certificado ES11/10640

ALMARIN, EQUIPOS Y SERVICIOS PORTUARIOS, S.L.

C/ Costa Brava, nº 25-29, local 10
08030 Barcelona

ISO 9001:2015

Diseño, gestión de la producción, distribución e instalación de equipos y soluciones de señalización para la navegación, portuarias e industriales.

C/ Costa Brava, nº 25-29, local 10 - 08030 Barcelona

Este certificado es válido desde 19 de octubre de 2017 hasta 19 de octubre de 2020.
Edición 4. Certificado con SGS desde octubre de 2011.

IAF ENAC


IALA

It is hereby certified that the firm
Certifie par la présente que la société
Se certifica que la firma

Almarin Equipos y Servicios Portuarios S.L.
(Spain)

Industrial member of IALA
Membre industriel de l'AISM
Miembro industrial de la IALA

Saint Germain en Laye, 01/Jan/2018

Francis Zacharias
Secretary-General


SGS

Certificado ES11/10639

ALMARIN, EQUIPOS Y SERVICIOS PORTUARIOS, S.L.

C/ Costa Brava, nº 25-29, local 10
08030 Barcelona

ISO 14001:2015

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IAF ENAC

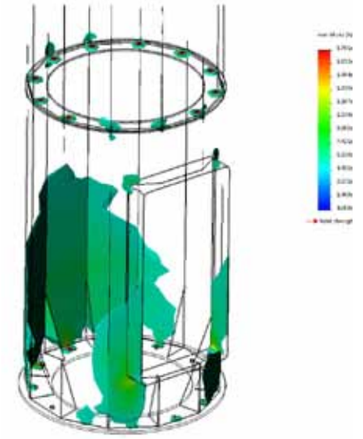
Engineering

Almarin benefits from Grupo Lindley's know-how and experience acquired over more than 85 years manufacturing and distributing products for the marine and port environment.

This trajectory represents an added value for customers, who can benefit from the experience gained and wide range of solutions offered.

R&D is normalized and planned under strict control by the ISO system. In Almarin, standard products are periodically reviewed to update designs and materials used.

New products are designed using three-dimensional software tools and tested using a variety of methods, from simulations with the most advanced softwares to lab tests and physical tests in our facilities and in the marine environment.



Recycling

Almarin products have been designed and manufactured with the goal of being totally reciclable. Here you can see how the various materials used in manufacturing our products can be recycled and reused:

Medium Density Polyethylene (MDPE). This polymer which is rotomoulded to form products can be reused through two processes, mechanical or chemical recycling. In both cases, a polymer of less quality is obtained and it can be used for other applications, as pipelines, packaging, plastic wrap, urban furniture, etc.

Polyethylene foam (PE). This polymer which is used in hull cores can also be reused after mechanical or chemical recyling. In both cases the result is a polymer of less quality that it's used for packaging, foam cushions, mockups, etc. Depending on the specific application, recycled polyethylene foam is ground and mixed in certain proportions with the virgin material or less demanding products. Almarin uses only virgin PE in the manufacture of its products.

Polystyrene foam (EPS). This polymer that is used for filling hulls can also be reused trough the mechanical or chemical recycling. Although the result is a polymer of less quality, this is used for other applications as filters, additives for floors, production of polystyrene (fusion), fillings, etc.

Galvanised steel. At the end of its service life, galvanised steel can be fully recycled without any loss of physical or chemical properties. It is possible to separate and recover both original metals, taking advantage of the fact that the volatilization temperature of the zinc is lower than the melting temperature of the steel.

Stainless steel. At the end of its service life stainless steel can be recycled and reused without any loss of physical or chemical properties. It is possible to separate and recover original metals, taking advantage of the fact that the volatilization temperature of the chromium is lower than the melting temperature of the steel.

MATERIALS

Models	BALIZAMAR BUOYS	GUIA BUOYS	SPECIAL BUOYS	BEACONS
Zinc	x	x		
Galvanised steel	x	x		x
Stainless steel	x	x	x	x
Polyethylene (PE)	x		x	
Closed-cell foam polyethylene		x		
Polystyrene foam (EPS)	x			

GRUPO LINDLEY

ALMARIN

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ALMOVI

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LINDLEY

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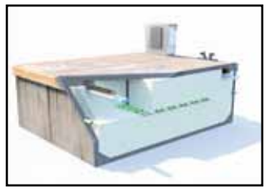
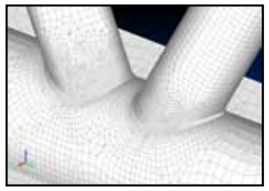
SALT TECHNOLOGIES

Marine Structures & Technology
Tel.: (+44) 776 839 59 68 · www.salttechnologies.uk

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