

## IALA GUIDELINE G1066



### MOORING CALCULATION WITH AN ALREADY PRE-DETERMINED BUOY

To start the mooring calculation with an already pre-determined buoy, it will be necessary to have the following information:



★ Physical details of the buoy to be moored.

The calculation of loads imposed on the mooring by the wind will require dimensions of the buoy superstructure and daymark.

The calculation of the forces imposed on the mooring by tidal flow or current will require dimensional details of the buoy body and tailtube or skirt.

The calculation of freeboard under maximum mooring load conditions will require the physical dimensions and the displacement of the chosen buoy.

★ Environmental conditions at the mooring site., including details of the worst anticipated wind forces, tidal flow or current and wave heights. Information on the type of bed on which the sinker sits is also needed.

★ Maintenance procedures.

★ Whether is needed to provide a safe working platform for the maintenance personnel.

★ Size and strength of mooring chain that is available.

★ Information regarding the sinkers that are available.

★ The capacity of the lifting equipment on the servicing vessels.



## How to decide which buoy should we use

If we need to decide which buoy should we use, we will need additional information. The performance characteristics of the buoy to be deployed will depend on the AtoN requirements of the stations and will be defined by the combination of:

1. The required light intensity.
2. The focal plane height.
3. The size of daymarks and associated top marks.
4. Other AtoN to be carried.
5. Remote control and monitoring system.
6. All associated power systems



The required AtoN positional accuracy may influence the design, when a smaller swinging radius is needed usually the solution is to use a smaller buoy or bigger chain.

When the mooring loads are calculated it may be found that a larger buoy body than was originally envisaged will be required.

The calculation process includes calculate the mooring loads, chain size, chain length, sinker size, swinging circle radius and the reserve buoyancy of the buoy. Further details on this exact process will be shared on next articles.

If the calculated swinging radius does not meet navigational requirements, then the mooring design can be recalculated with a heavier chain or change completely the mooring design (use a taut mooring or a resilient beacon).



**The mooring calculation is a dynamic process with multiple valid solutions and various approximations may be needed.**

If the swinging radius obtained from the calculation is not a problem, then a longer chain may be investigated to see the effects of increasing the chain length to reduce loads on the sinker or possibly reduce the size of the sinker.