

*Tideland Signal Corp.*

*featuring Aids to Navigation Products*

## 2.3 MOORINGS

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<b>Rev</b>	<b>Description</b>	<b>Date</b>	<b>By</b>

## A. Introduction

The following pages provide indicative information concerning the suggested mooring configurations for Tideland Signal's range of polyethylene buoys.

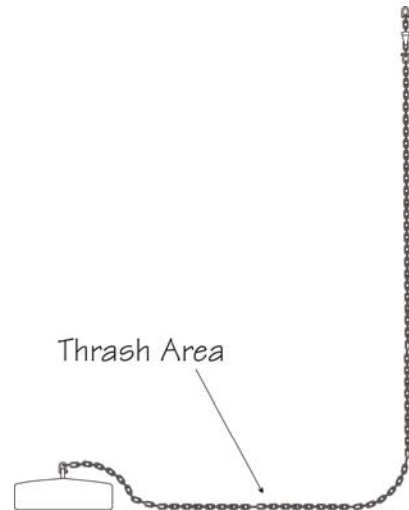
**Naturally moorings will greatly depend upon the location, sea and weather conditions. All calculations should be checked by Tideland or by using the IALA mooring formula.**

Commonly open link chain is used and occasionally stud-link-chain. For most applications an open link (studless) chain is more than adequate to moor a buoy.

Chain is usually supplied uncoated or sometimes painted or bitumen coated. It is a misconception that galvanized chain lasts longer. It may look nice lying on the dock but the chain will still wear at the links and in the "thrash" zone. Galvanized chain is typically 20% to 30% more expensive and does nothing for the user.

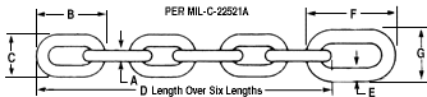
When designing a mooring system it is always important to ensure that the correct weight and length of mooring chain is used. Too much weight and a buoy could sink. Too little length and the motion of the buoy might snap taut, breaking part of the mooring system or moving the sinker. Another consideration is the "thrash" area, which is where the chain comes into contact with the seabed and experiences the most wear.

Authorities will often use larger diameter chain in this area to increase the lifetime of the mooring system.



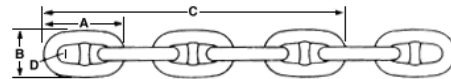
Sample chain weights are shown below. Always confirm the exact weights with your supplier.

### Open Link



<b>19 mm (0.75")</b>	7.1 kg/m (4.9 lbs/ft)
<b>22 mm (0.875")</b>	9.8 kg/m (6.75 lbs/ft)
<b>25 mm (1")</b>	12.6 kg/m (8.7 lbs/ft)
<b>28 mm (1.125")</b>	16.0 kg/m (11.0 lbs/ft)
<b>32 mm (1.25")</b>	20.0 kg/m (13.8 lbs/ft)
<b>38 mm (1.5")</b>	28.3 kg/m (19.5 lbs/ft)
<b>44 mm (1.75")</b>	38.1 kg/m (26.3 lbs/ft)
<b>50 mm (2")</b>	50.37 kg/m (34.7 lbs/ft)

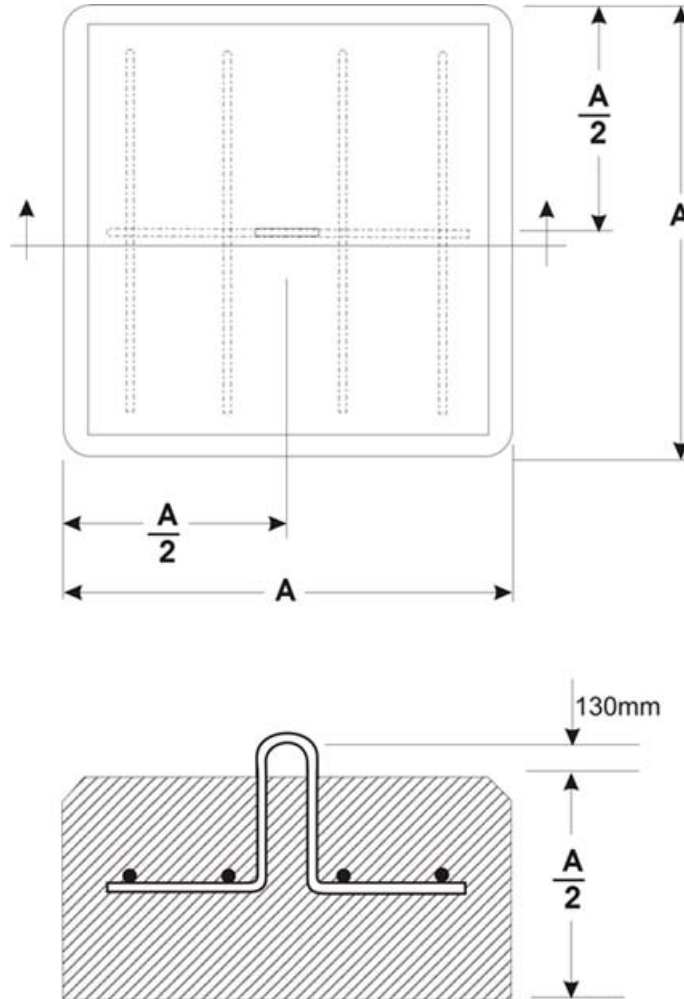
### Stud Link



<b>19 mm (0.75")</b>	6.9 kg/m (4.8 lbs/ft)
<b>25 mm (1")</b>	13.9 kg/m (9.6 lbs/ft)
<b>38 mm (1.5")</b>	31.2 kg/m (21.5 lbs/ft)
<b>44 mm (1.75")</b>	42.1 kg/m (29.0 lbs/ft)
<b>50 mm (2")</b>	54.8 kg/m (37.8 lbs/ft)

## B. Typical Sinker

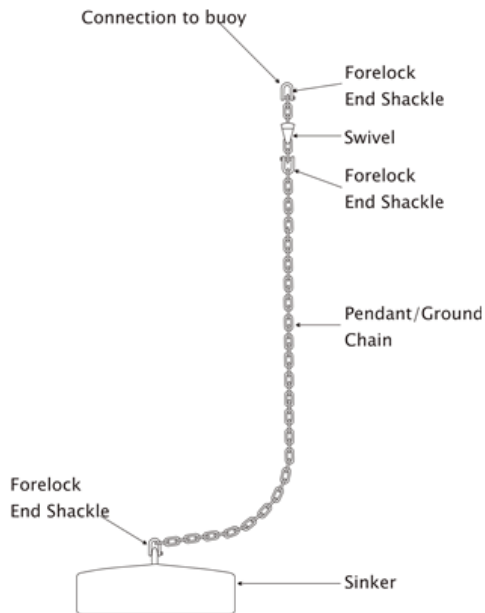
Usually concrete sinkers are used because material is readily available and manufacturing is very cost effective. Below is a typical design of concrete sinker.



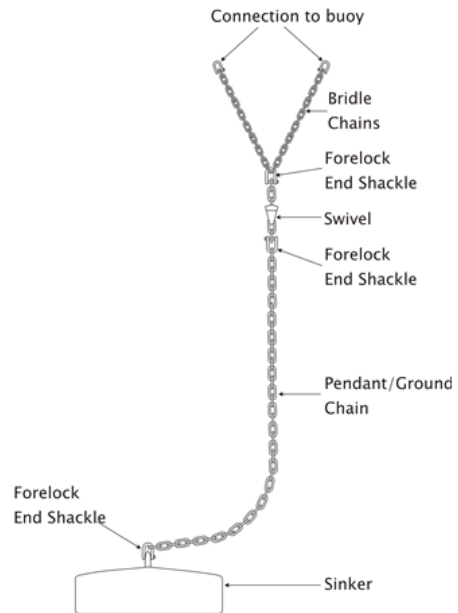
Weight	Dim. A	Bar Diameter
500 lbs (227 kg)	23.2" (589 mm)	1.0" (25 mm)
1000 lbs (454 kg)	29.2" (742 mm)	1.25" (32 mm)
2000 lbs (907 kg)	36.8" (935 mm)	1.25" (32 mm)
3000 lbs (1361 kg)	42.2" (1072 mm)	2.0" (50 mm)
4000 lbs (1814 kg)	46.4" (1179 mm)	2.0" (50 mm)
6000 lbs (2722 kg)	53.0" (1346 mm)	2.0" (50 mm)
8000 lbs (3629 kg)	58.5" (1486 mm)	2.375" (60 mm)

## C. Typical Mooring configurations

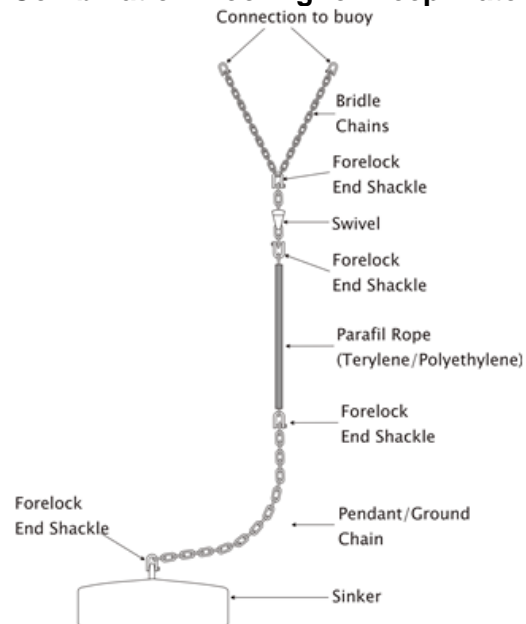
### Single Mooring Connection



### Double Mooring Connection



### Combination Mooring for Deep Water



## **D. Mooring and Sinker Design Notes**

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The following pages contain typical mooring data for a selection of Tideland Signal buoys.

The data are based upon a typical, sandy sea bed and a wind speed of 100km/hour.

The sinker weights are the minimum recommended weight.

Often, local knowledge and conditions will dictate the required mooring.

For an accurate mooring and sinker calculation, utilizing the IALA mooring program, please contact your local Tideland representative.

## SB-60P

<b>SB-60 Mooring Table - current = 2 knots</b>				
Water Depth	Chain Length	Chain Size	Counter Weight	Sinker Air Weight
<10 m*	15 m	28 mm	135 kg	*250 kg
10 - 15 m	23 m	28 mm	135 kg	*250 kg
15 - 25 m	40 m	25 mm	NA	*350 kg
25 - 35 m	54 m	19 mm	NA	*350 kg
35 - 50 m	75 m	16 mm	NA	*400 kg
50 - 60 m**	90 m	16 mm	NA	*400 kg

\* Recommendation is to use a 500 kg sinker for all above conditions.

<b>SB-60 Mooring Table - current = 4 knots</b>				
Water Depth	Chain Length	Chain Size	Counter Weight	Sinker Air Weight
<10 m*	20 m	28 mm	135 kg	750 kg
10 - 15 m	30 m	25 mm	135 kg	750 kg
15 - 25 m	50 m	22 mm	NA	1000 kg
25 - 35 m	58 m	19 mm	NA	1000 kg
35 - 50 m	86 m	16 mm	NA	1200 kg
50 - 60 m**	97 m	16 mm	NA	1200 kg

\*The SB-60 requires a minimum mooring weight of 255 kg (Air weight), to stand upright. A counterweight may be required in shallow water.

\*\*Water depths of greater than 50 m may require use of a combination of chain and rope pendant.



<b>SB-98 Mooring Table for Current less than 2 Knots</b>			
<b>Water Depth</b>	<b>Chain Length</b>	<b>Chain Size</b>	<b>Sinker Air Weight</b>
<10 m*	15 m	32-29 mm	*250 kg
10 - 15 m	23 m	28 mm	*250 kg
15 - 25 m	38 m	25 mm	*300 kg
25 - 35 m	52 m	22 mm	*300 kg
35 - 40 m**	60 m	19 mm	*350 kg
>40 m**	Consult Factory for evaluation		

\* Recommendation is to use a 400 kg sinker for all above conditions.

<b>SB-98 Mooring Table for Current 2 to 4 Knots</b>			
<b>Water Depth</b>	<b>Chain Length</b>	<b>Chain Size</b>	<b>Sinker Air Weight</b>
<10 m*	18 m	32-29 mm	**600 kg
10 - 15 m	24 m	28 mm	**700 kg
15 - 25 m	38 m	25 mm	**900 kg
25 - 35 m	55 m	22 mm	**900 kg
35 - 40 m**	62 m	19 mm	**1000 kg
>40 m**	Consult Factory for evaluation		

\*\* Recommendation is to use a 1000 kg sinker for all above conditions.

<b>SB-98 Mooring Table for Current 4 to 6 Knots</b>			
<b>Water Depth</b>	<b>Chain Length</b>	<b>Chain Size</b>	<b>Sinker Air Weight</b>
<10 m*	23 m	29 mm	1500 kg
10 - 15 m	30 m	29 mm	1750 kg
15 - 25 m	51 m	22 mm	2000 kg
25 - 35 m	72 m	19 mm	2000 kg
35 - 40 m**	79 m	19 mm	2250 kg
>40 m**	Consult Factory for evaluation		

\* The SB-98 is designed for moderate to heavy current and shallow to deep water. However when mooring this buoy in heavy current and/or shallow water a minimum mooring load of between 180 to 225 kg is required. This is best provided by mooring chain but in shallow water, where this may not be practicable, a suspended weight may be required.

The mooring load will slow the buoy motion roll, providing a better light platform and avoid the tendency for the mooring to come up taut, placing unnecessary stress on all the mooring points

Recommended chain weight: minimum 180 kg; maximum 540 kg.

Sinkers in poor holding ground (rock or coral) may require up to 30% more weight.

\*\*Water depths of greater than 40 m may require use of a combination of chain and rope pendant.



## SB-138P

<b>SB-138P Mooring Table for Current less than 2 Knots</b>			
<b>Water Depth</b>	<b>Chain Length</b>	<b>Chain Size</b>	<b>Sinker Air Weight</b>
<10 m*	16 m	28 mm	400 kg
10 – 15 m	24 m	25 mm	400 kg
15 – 25 m	38 m	25 mm	500 kg
25 – 35 m	52 m	22 mm	500 kg
35 – 50 m	75 m	19 mm	500 kg
>50 m**	Consult Factory for evaluation		

<b>SB-138P Mooring Table for Current 2 to 4 Knots</b>			
<b>Water Depth</b>	<b>Chain Length</b>	<b>Chain Size</b>	<b>Sinker Air Weight</b>
<10 m*	17 m	38 mm	1000 kg
10 – 15 m	23 m	32 mm	1000 kg
15 – 25 m	43 m	25 mm	1250 kg
25 – 35 m	54 m	25 mm	1500 kg
35 – 50 m	78 m	22 mm	1500 kg
>50 m**	Consult Factory for evaluation		

<b>SB-138P Mooring Table for Current 4 to 6 Knots</b>			
<b>Water Depth</b>	<b>Chain Length</b>	<b>Chain Size</b>	<b>Sinker Air Weight</b>
<10 m*	22 m	28 mm	1800 kg
10 – 15 m	33 m	32 mm	2000 kg
15 – 25 m	54 m	25 mm	2500 kg
25 – 35 m	75 m	22 mm	2750 kg
>35 m**	Consult Factory for evaluation		

1. Minimum recommended chain size is 19 mm
2. Recommended mooring loads: minimum 140 kg; maximum 636 kg.
3. Bridle weight included; chain weight is used for partial ballast of buoy; typical bridle dimensions: 22 mm diameter x 3 m length; total air weight of a bridle is typically 40kg.
4. Mooring Depth: minimum 2 - 3 m with little or no tidal stream; typical maximum 60 m. Greater depths can be accommodated with a combination of chain and synthetic material, consult Tideland.
5. Depending upon site conditions shallow moorings may require heavier chain.
6. Sinkers in poor holding ground (rock or coral) may require up to 30% more weight.



## SB-2200

SB-2200 Mooring Table for Current less than 2 Knots			
Water Depth	Chain Length	Chain Size	Sinker Air Weight
<10 m*	21 m	32 mm	*800 kg
10 – 15 m	27 m	32 mm	*800 kg
15 - 25 m	41 m	28 mm	*800 kg
25 – 35 m	56 m	25 mm	*900 kg
35 – 60 m	90 m	22 mm	*900 kg

\* Recommendation is to use a 1000 kg sinker for all above conditions.

SB-2200 Mooring Table for Current 2 to 4 Knots			
Water Depth	Chain Length	Chain Size	Sinker Air Weight
<10 m*	20 m	38 mm	1750 kg
10 – 15 m	30 m	38 mm	1750 kg
15 – 25 m	53 m	28 mm	2000 kg
25 – 35 m	72 m	25 mm	2000 kg
35 – 60 m	114 m	22 mm	2500 kg

SB-2200 Mooring Table for Current 4 to 6 Knots			
Water Depth	Chain Length	Chain Size	Sinker Air Weight
<10 m*	31 m	38 mm	3000 kg
10 – 15 m	47 m	32 mm	3500 kg
15 – 25 m	63 m	28 mm	4000 kg
25 - 35 m	94 m	25 mm	4000 kg

For depths greater than 60m consult factory for correct mooring evaluation.

1. Minimum recommended chain size is 19mm
2. Recommended chain weight: minimum 220kg; maximum 1175kg.
3. Air weight of typical bridle configuration (2 x 38 mm x 6 m) is 136kg.
4. Mooring Depth: minimum 6m; typical maximum 60m. Greater depths can be accommodated with a combination of chain and synthetic material, consult Tideland.
5. Depending upon site conditions shallow moorings may require heavier chain.
6. Sinkers in poor holding ground (rock or coral) may require up to 30% more weight.



## SB-285P

SB-285P Mooring Table for Current less than 2 Knots			
Water Depth	Chain Length	Chain Size	Sinker Air Weight
<10 m*	19 m	38 mm	*1000 kg
10 – 15 m	24 m	38 mm	*1000 kg
15 - 25 m	39 m	32 mm	*1000 kg
25 – 35 m	58 m	25 mm	*1250 kg
35 – 60 m	90 m	25 mm	*1250 kg

\* Recommendation is to use a 1250 kg sinker for all above conditions.

SB-285P Mooring Table for Current 2 to 4 Knots			
Water Depth	Chain Length	Chain Size	Sinker Air Weight
<10 m*	24 m	38 mm	2000 kg
10 – 15 m	31 m	38 mm	2000 kg
15 – 25 m	54 m	28 mm	2000 kg
25 – 35 m	73 m	25 mm	2500 kg
35 – 60 m	115 m	22 mm	2500 kg

SB-285P Mooring Table for Current 4 to 6 Knots			
Water Depth	Chain Length	Chain Size	Sinker Air Weight
<10 m*	31 m	38 mm	3250 kg
10 – 15 m	39 m	38 mm	3500 kg
15 – 25 m	69 m	28 mm	4000 kg
25 - 35 m	93 m	25 mm	4250 kg
35 - 60 m	169 m	19 mm	4500 kg

For greater depths greater than 60m consult factory for correct mooring evaluation.

1. Minimum recommended chain size is 19mm
2. Recommended chain weight: minimum 320kg; maximum 1575kg.
3. Air weight of typical bridle configuration (2 x 38 mm x 6 m) is 136kg.
4. Mooring Depth: minimum 6m; typical maximum 60m. Greater depths can be accommodated with a combination of chain and synthetic material, consult Tideland.
5. Depending upon site conditions shallow moorings may require heavier chain.
6. Sinkers in poor holding ground (rock or coral) may require up to 30% more weight.

