

Tables

RANGE TABLES

LUMINOUS RANGE AT NIGHT

Luminous range

The luminous range of a light is the maximum distance at which the light can be seen by an observer. It is determined by the luminous intensity of the light and by the atmospheric transmissivity.

Nominal range

The nominal range of a light is its luminous range under atmosphere conditions of T = 0.74, equivalent to a meteorological visibility of 10 n.m.

Day light luminous range

Nominal range (T=0.74)	Intensity (Candela)
1	4.600
2	25.000
3	76.000
4	182.000
5	383.000
6	745.000
7	1.400.000
8	2.400.000
9	4.100.000
10	6.900.000
12	18.000.000
15	69.000.000

Nota: These required intensities are based on a sky luminance of 10,000 cd/m² equivalent to bright cloud or clear sky close to the direction of the sun. This value of sky luminance corresponds to an illuminance in the eye of the observer of 1 mililux. (IALA Recommendation nº 60)

weather	excellent	very clear	clear	rlight haze	haze	
visibility	20 n.m.	14 n.m.	10 n.m.	6 n.m.	2.5 n.m.	1.3 n.m.
T= I (Cd)	0.85	0.80	0.74	0.6	0.3	0.1
	Nominal					
1	1.1	1.1	1.0	0.9	0.8	0.6
3	1.8	1.8	1.6	1.4	1.1	0.8
5	2.2	2.2	2.0	1.7	1.3	0.9
10	3.0	2.8	2.6	2.2	1.5	1.1
15	3.5	3.3	3.0	2.5	1.7	1.2
20	3.9	3.7	3.3	2.7	1.8	1.3
25	4.3	4.0	3.5	2.9	1.9	1.3
30	4.6	4.2	3.8	3.0	2.0	1.4
37	4.9	4.6	4.0	3.2	2.1	1.4
40	5.1	4.7	4.1	3.3	2.1	1.4
50	5.5	5.0	4.4	3.5	2.2	1.5
77	6.3	5.8	5.0	3.9	2.4	1.6
100	6.9	6.3	5.4	4.2	2.6	1.7
150	7.8	7.0	6.0	4.6	2.8	1.8
200	8.5	7.6	6.5	4.9	2.9	1.9
250	9.1	8.1	6.8	5.1	3.0	2.0
275	9.4	8.3	7.0	5.2	3.1	2.0
300	9.6	8.5	7.1	5.3	3.1	2.0
400	10.4	9.2	7.6	5.7	3.3	2.1
500	11.0	9.7	8.0	5.9	3.4	2.2
700	12.0	10.5	8.7	6.3	3.6	2.3
835	12.6	10.9	9.0	6.5	3.7	2.3
1,000	13.1	11.4	9.3	6.8	3.8	2.4
1,400	14.2	12.3	10.0	7.2	4.0	2.5
1,500	14.4	12.5	10.1	7.3	4.1	2.5
2,000	15.4	13.2	10.7	7.6	4.2	2.6
2,250	15.8	13.6	11.0	7.8	4.3	2.7
2,500	16.2	13.9	11.2	7.9	4.4	2.7
3,000	16.8	14.4	11.6	8.2	4.5	2.8
3,650	17.5	14.9	12.0	8.4	4.6	2.8
4,000	17.9	15.2	12.2	8.6	4.6	2.9
5,000	18.7	15.8	12.7	8.9	4.8	2.9
5,800	19.2	16.3	13.0	9.1	4.9	3.0
7,000	20.0	16.8	13.4	9.3	5.0	3.0
9,100	21.0	17.6	14.0	9.7	5.2	3.1
10,000	21.3	17.9	14.2	9.8	5.2	3.2
14,000	22.7	19.0	15.0	10.3	5.4	3.3
15,000	22.9	19.2	15.1	10.4	5.5	3.3
20,000	24.1	20.1	15.8	10.8	5.7	3.4
22,000	24.5	20.4	16.0	10.9	5.7	3.4
25,000	25.0	20.8	16.3	11.1	5.8	3.5
30,000	25.8	21.4	16.8	11.4	5.9	3.5
33,000	26.2	21.7	17.0	11.5	6.0	3.6
40,000	27.0	22.4	17.4	11.8	6.1	3.6
50,000	27.9	23.1	18.0	12.1	6.3	3.7
70,000	29.4	24.2	18.8	12.6	6.5	3.8
75,000	29.7	24.5	19.0	12.7	6.5	3.9
100,000	30.9	25.4	19.7	13.2	6.7	4.0
113,000	31.5	25.8	20.0	13.4	6.8	4.0
150,000	32.7	26.8	20.7	13.8	7.0	4.1
170,000	33.3	27.3	21.0	14.0	7.1	4.2
200,000	34.0	27.8	21.4	14.2	7.2	4.2
250,000	35.0	28.6	22.0	14.6	7.3	4.3
300,000	35.9	29.3	22.5	14.9	7.5	4.4
370,000	36.8	30.0	23.0	15.2	7.6	4.4
400,000	37.2	30.3	23.2	15.3	7.6	4.5
500,000	38.2	31.1	23.8	15.7	7.8	4.5
550,000	38.7	31.4	24.0	15.8	7.9	4.6
700,000	39.8	32.3	24.7	16.2	8.0	4.7
800,000	40.4	32.8	25.0	16.4	8.1	4.7
1,000,000	41.5	33.6	25.6	16.7	8.3	4.8
1,170,000	42.2	34.2	26.0	17.0	8.4	4.9
1,700,000	44.0	35.5	27.0	17.6	8.6	5.0
2,470,000	45.8	36.9	28.0	18.2	8.9	5.1
3,580,000	47.6	38.3	29.0	18.8	9.2	5.3
5,180,000	49.4	39.7	30.0	19.4	9.4	5.4
10,000,000	52.7	42.2	31.8	20.5	9.9	5.7
20,000,000	56.2	44.9	33.7	21.6	10.4	5.9

Note: The above figures are based on the conventional value of the threshold of illuminance on the eye of the observer of 0.2 microlux, and background free of illumination..

Atmospheric transmission factor

The atmospheric transmission factor (T) indicates the light transmission per nautical mile through the atmosphere, and is a factor characterising the transparency of the atmosphere.

This factor is closely related to the meteorological visibility as shown in the table.



Atmospheric transmission factor	Meteorological visibility (n.m.)	Weather
0.0025	0.5	Thin fog
0.05	1,0	
0.1	1.3	Haze
0.2	1.8	
0.3	2.5	Light haze
0.4	3.2	
0.5	4.3	
0.6	6,0	Clear
0.7	8.5	
0.74	10,0	Very clear
0.8	14,0	
0.85	20,0	Excepcionally clear
0.9	29,0	
1,0	unlimited	Perfectly clear

Geographical range

The geographical range of a seamark (light or object) is the maximum distance at which it can be seen by an observer over the sea horizon. It depends on the elevation above the water level of the seamark and the height of the observer's eye.

A geographical range table in nautical miles is given below:

Height of observer eye (m)	Elevation of seamark (m)													
	0	1	2	3	4	5	6	10	15	20	50	100	200	300
0	0,0	2,0	2,9	3,5	4,1	4,5	5,0	6,4	7,9	9,1	14,4	20,3	28,7	35,2
1	2,0	4,1	4,9	5,5	6,1	6,6	7,0	8,5	9,9	11,1	16,4	22,3	30,8	37,2
2	2,9	4,9	5,7	6,4	6,9	7,4	7,8	9,3	10,7	12,0	17,2	23,2	31,6	38,1
5	4,5	6,6	7,4	8,1	8,6	9,1	9,5	11,0	12,4	13,6	18,9	24,9	33,3	39,7
10	6,4	8,5	9,3	9,9	10,5	11,0	11,4	12,8	14,3	15,5	20,8	26,7	35,1	41,6
15	7,9	9,9	10,7	11,4	11,9	12,4	12,8	14,3	15,7	16,9	22,2	28,2	36,6	43,0
20	9,1	11,1	12,0	12,6	13,1	13,6	14,1	15,5	16,9	18,2	23,4	29,4	37,8	44,3
30	11,1	13,2	14,0	14,6	15,2	15,7	16,1	17,5	19,0	20,2	25,5	31,4	39,8	46,3