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# Shipbuilding — Welded steel bollards

## ADDENDUM 1 : Double bollards for inland navigation

Addendum 1 to International Standard ISO 3913 was developed by Technical Committee ISO/TC 8, *Shipbuilding*, and was circulated to the member bodies in December 1978.

It has been approved by the member bodies of the following countries :

Austria	France	Poland
Belgium	India	Romania
Brazil	Italy	Turkey
Bulgaria	Japan	United Kingdom
China	Korea, Dem. P. Rep. of	USSR
Czechoslovakia	Korea, Rep. of	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Finland  
Germany, F. R.  
Netherlands  
Norway

### 1 Scope and field of application

**1.1** This Addendum to ISO 3913 specifies requirements for welded double bollards used on vessels for inland waterways.

It lays down the materials and construction for a range of nominal sizes 70 to 500 and states the maximum loading for which the bollards are intended.

**1.2** The method of construction and details of welding are not specified, but each manufacturer shall ensure the necessary strength of the bollards. Loading tests shall be performed as described in clause 8.

### 2 References

ISO 64, *Steel tubes — Outside diameters.*

ISO 221, *Steel tubes — Wall thickness.*

### 3 Classification

#### 3.1 Types

Depending on the construction, two types of welded double bollards are to be distinguished :

- type A — vertical with lugs;
- type B — cruciform.

#### 3.2 Forms

Depending on the method of installation, two forms of bollards are to be distinguished :

- form I — with baseplate;
- form II — built-in bollards.

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**Descriptors :** shipbuilding, steel products, bollards (towing and mooring), dimensions, materials specifications, loads (forces).

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### 3.3 Nominal sizes

The nominal size,  $D_n$ , of a bollard shall be denoted by reference to the outside diameter of the bitts in terms of the nearest number drawn from a basic series of preferred numbers. The nominal sizes are :

70, 90, 100, 125, 160, 200, 250, 315, 400, 500.

NOTE — The outside diameters,  $D$ , of bitts are based on steel tubes selected from ISO 64.

## 4 Dimensions and loading

**4.1** Welded steel bollards shall have dimensions and loading particulars in accordance with the table and figures 1, 2 and 3.

**4.2** The values of maximum loading given in the table refer to a single mooring rope wound in "figure-of-eight" fashion around the bitts; the application of two ropes with loadings as given in the table is also permitted.

A single rope may be used with a load twice that given in the table.

## 5 Material

The bollards shall be made from weldable quality steel having a tensile strength of 360 N/mm<sup>2</sup> minimum or 410 N/mm<sup>2</sup> minimum. A specified thickness of bitts made from tube or plate is given in the table.

## 6 Construction

**6.1** The details of construction of the bollard, including welding details, shall be determined by the manufacturer to comply with the requirements of this International Standard.

**6.2** The bitts of the bollards shall be constructed from steel tubes or formed from plate.

**6.3** The baseplate of bollards shall be made according to figures 1 and 2. The method of fixing built-in bollards shall be determined by the manufacturer.

**6.4** The type and dimensions of welds shall be determined by the manufacturer. The welds connecting the bollards with the deck shall guarantee reliable transmission of the maximum

loading of the bollards without any plastic deformation and cracks.

**6.5** If an oval eyeplate is required to be fitted to the baseplate for the purpose of securing a chain or rope stopper, the strength of the eyeplate should be equal to one-quarter of the strength of the maximum loading appropriate to the nominal size of the bollard.

## 7 Quality of manufacture

**7.1** All surfaces of the bollard, including welds, shall be free from any visible flaws or imperfections.

**7.2** All surfaces in contact with ropes shall be free from surface roughness or irregularities likely to cause damage to the ropes by abrasion.

**7.3** After mounting on deck, the bollards shall be coated externally with an anti-corrosive protective finish.

## 8 Loading tests

**8.1** After mounting on deck, each nominal size of bollard shall be type-tested by the manufacturer to prove the construction and quality adopted.

**8.2** The test shall be applied by one of the following methods :

- a) mounting two ropes in "figure-of-eight" fashion (see figure 4) and inducing loads simultaneously in each rope to the value for the nominal size of bollard given in the table, or
- b) mounting a single rope on one bitt at a height of  $1,2 D_n$  above the top of the baseplate (see figure 5) and applying twice the appropriate loading value given in the table. The test shall be repeated on the other bitt.

**8.3** After the application of the loading test, the bollards shall be examined to ascertain that :

- a) no change occurs in the centre-to-centre dimension ( $l$ ) measured across the tops of the bitts;
- b) no part of the bollard shows any signs of permanent deformation or failure;
- c) all principal welds are free from cracks and flaws.

Table — Dimensions and loads of bollards

Nominal size $D_n$	$D^{1)}$	t specified						Dimensions, mm													Single rope maximum loading ( $P$ ) kN	
		tube		plate		$D_1 \times t_1$	$F^2)$	$F^2)$	$G$	$H$	$H_1$	$d$	$d_1$	$e$	$h^2)$	$h_1$	$h_2$	$l$	$l_1$	$r$		$s$
		360 N/mm <sup>2</sup> min.	410 N/mm <sup>2</sup> min.	360 N/mm <sup>2</sup> min.	410 N/mm <sup>2</sup> min.																	
70	70,0	5,9	5,9	5,9	5,9	38 × 4,0	135	310	315	110	140	90	50	10	40	35	67	175	20	6	6	10
90	88,9	8	8	8	8	44,5 × 4,0	145	400	405	140	180	110	60	10	50	45	85	240	25	6	6	20
100	114,3	10	10	10	10	57 × 6,3	150	450	495	160	220	140	75	10	75	50	105	250	30	8	8	30
125	139,7	10	10	10	10	70 × 6,3	190	560	630	200	260	170	90	10	80	65	135	315	35	8	8	40
160	168,3	10	10	10	10	82,5 × 6,3	250	720	810	260	350	200	110	10	90	85	170	400	45	8	8	50
200	219,1	12,5	11	10	10	108 × 8,0	300	900	990	310	440	265	145	15	100	100	215	500	50	10	10	80
250	273,0	14,2	12,5	12	11	139,7 × 8,0	380	1 130	1 260	392	510	325	180	15	125	125	250	630	60	14	14	120
315	323,9	17,5	16	16	15	168,3 × 8,0	480	1 430	1 620	496	670	395	230	20	150	160	325	800	75	16	16	200
400	406,4	22,2	20	19	18	219,1 × 10,0	600	1 800	2 025	620	835	500	310	25	175	200	410	1 000	90	18	18	320
500	508,0	25	22,2	22	20	—	750	2 250	—	772	—	620	—	30	200	250	—	1 250	120	24	24	460

1) Outside diameter tolerances for bollard bits, ( $D$ ), made of tube or steel plate, are  $\pm 1\%$ .

2) Dimensions  $E$ ,  $F$  and  $h$  are given for guidance only.

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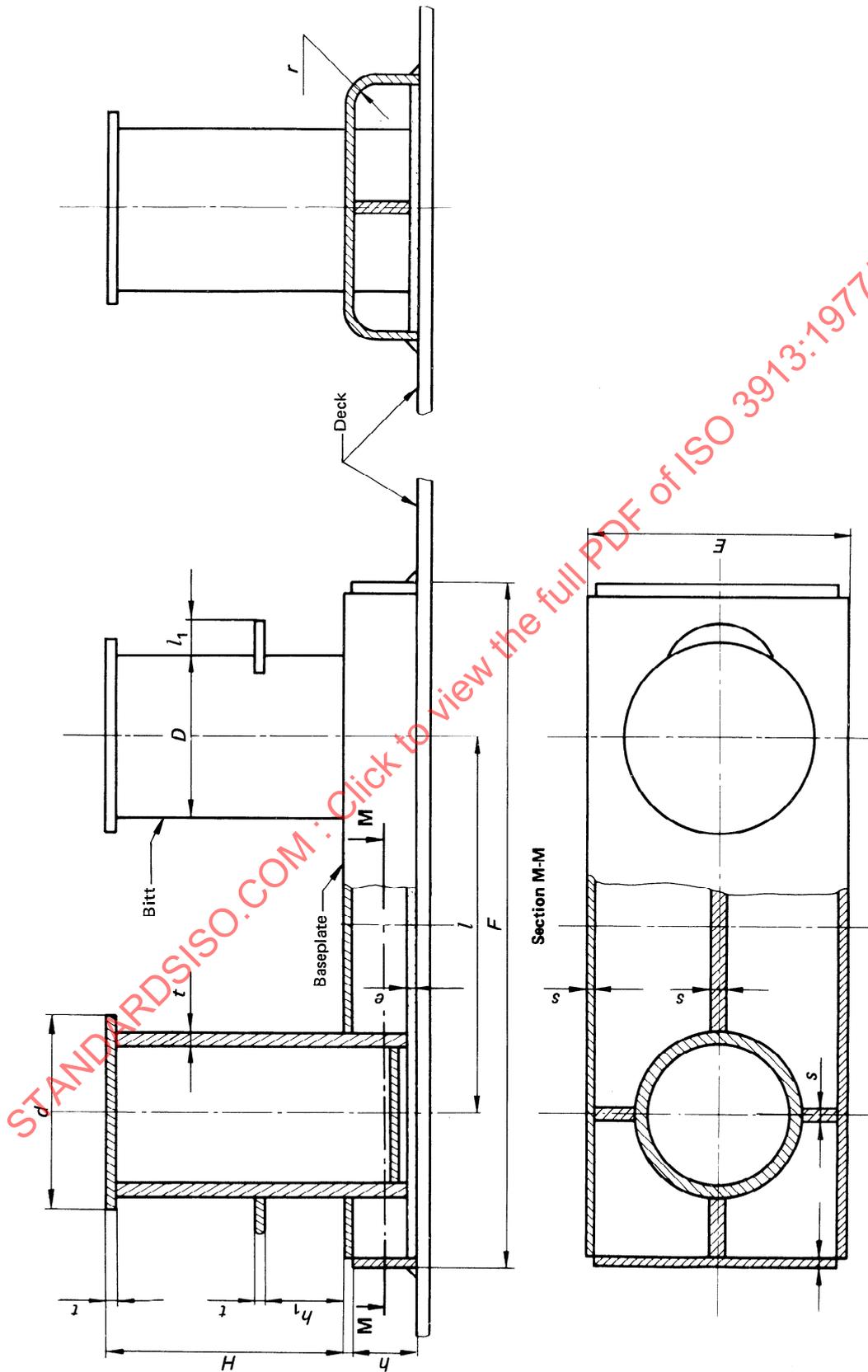


Figure 1 — Vertical bollard with baseplate — Type A, form I

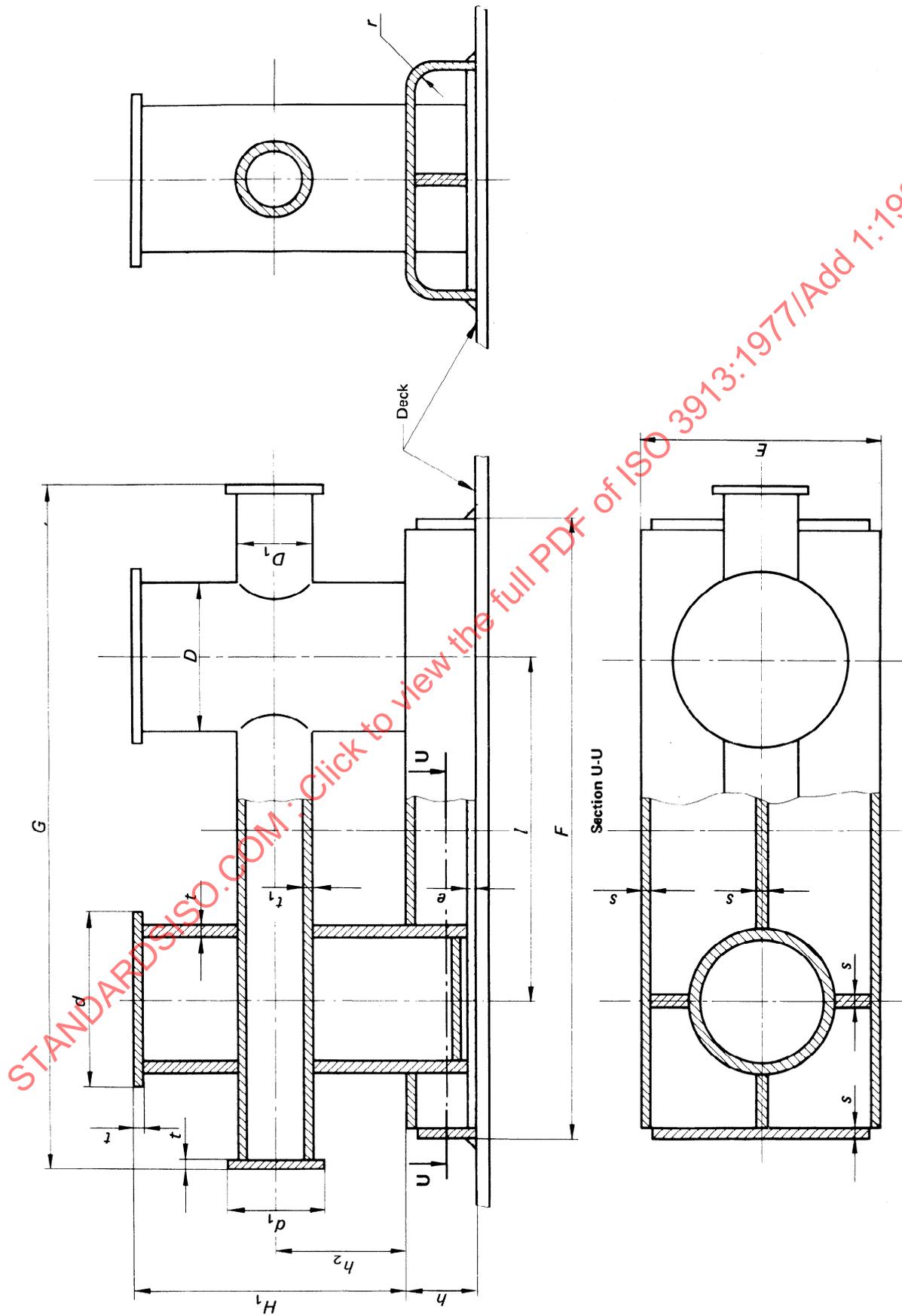
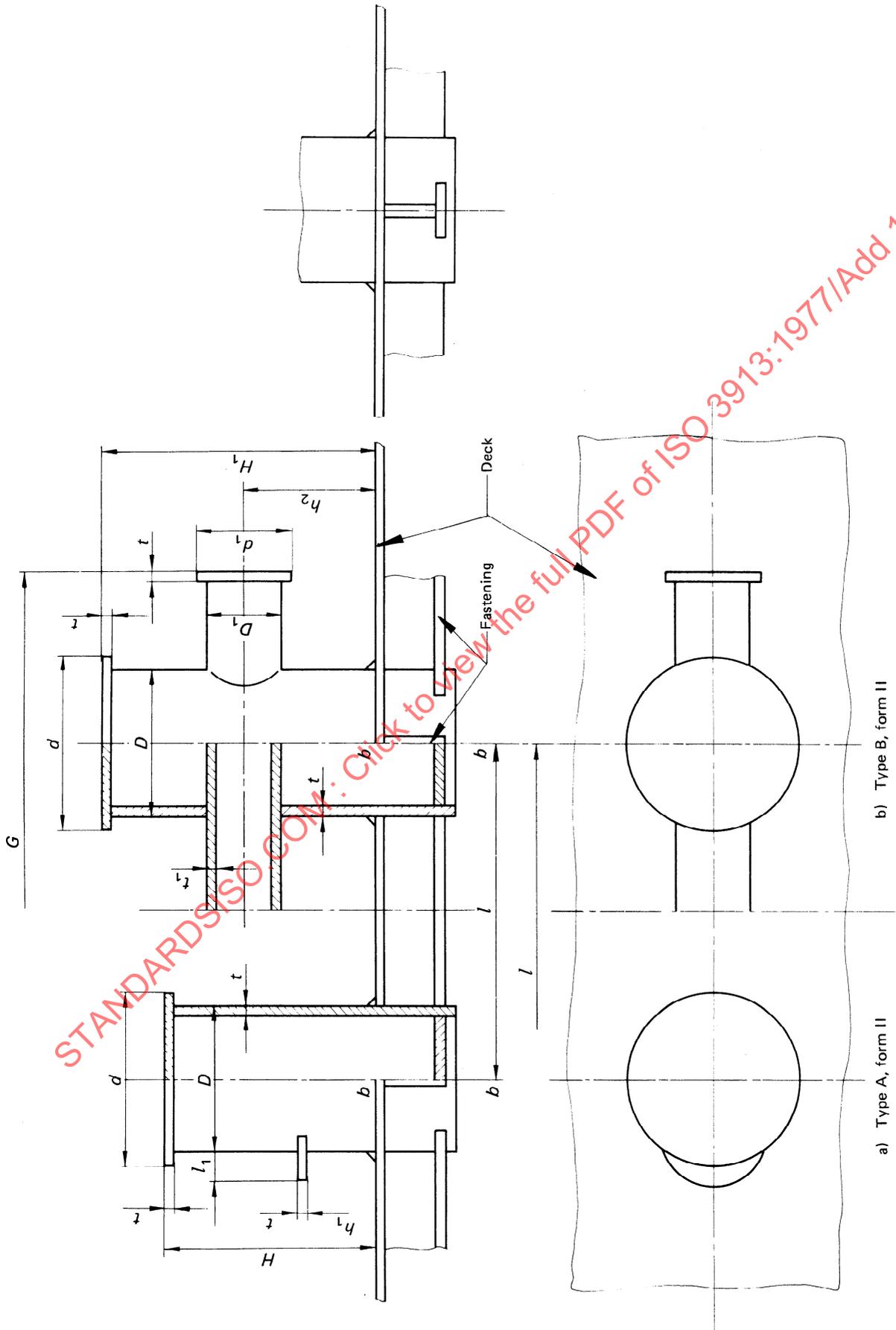


Figure 2 — Cruciform bollard with baseplate — Type B, form I



b) Type B, form II

a) Type A, form II

Figure 3 — Built-in bollards — Vertical and cruciform types