



**DELIVERING HIGH QUALITY  
MOORING BOLLARDS  
TO THE AMERICAS**

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**ESC MOORING BOLLARDS  
CATALOG**

2023 EDITION  
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## ESC MOORING BOLLARDS

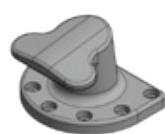
Marine mooring bollards provide a simple yet efficient method for fulfilling mooring requirements to allow safe securing of vessels next to jetties, wharves, berths and dolphins in ports and harbors. ESC can offer a wide range of cast iron or steel bollards in various sizes, grades and capacities.

ESC bollards are designed and manufactured in accordance to standards and guidelines such as BS6349: Part 4 and PIANC. Bollards are safety critical components and ESC strives to provide bollards with superior service life and resistance to physical and corrosive environments.

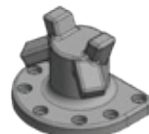
### ESC offers a full range of Mooring Bollards

- ✓ Cast iron and steel bollards in a range of configurations.
- ✓ Up to 300 ton capacity
- ✓ Complete with anchoring sets
- ✓ Corrosion Protection Coating options—primer, epoxy coating, galvanized, duplex (galvanized & painted)
- ✓ Fully customizable as bollards vary significantly between ports and countries.

### STANDARD DESIGNS



T-HEAD



T-HORN



KIDNEY



CLEAT



SINGLE BITT



DOUBLE BITT



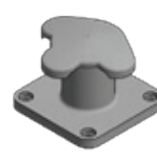
PILLAR



T HEAD JAPANESE DESIGN



PILLAR JAPANESE DESIGN



TRICORN

### STANDARD RANGE

SECTION	RATING (TONS)																	
	1	5	10	15	20	25	30	35	50	70	75	80	100	125	150	200	250	300
T-Head			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
T-Horn				✓			✓		✓			✓	✓		✓	✓		
Kidney				✓			✓		✓				✓		✓	✓		
Cleat	✓	✓	✓	✓	✓	✓	✓	✓										
Single Bitt			✓	✓			✓		✓		✓		✓		✓	✓		
Double Bitt					✓		✓		✓		✓		✓		✓	✓		
Pillar			✓	✓			✓		✓				✓		✓	✓		
Pillar Japanese Design				✓		✓		✓	✓	✓			✓		✓	✓		
T-Head Japanese Design		✓	✓	✓		✓	✓	✓	✓	✓			✓		✓	✓		
Tricorn							✓		✓				✓		✓	✓	✓	✓

## MATERIAL SPECIFICATION

ESC bollards are produced to the highest specifications. The table gives indicative standards and grades but many other options are available on request.

MATERIALS	STANDARD(S)	GRADE(S)
Ductile Cast Iron	BS EN 1563	EN-GJS-450-10/ 500-7/ 600-3
	ASTM A536	65-45-12/ 70-50-5/ 80-55-6
	GB/T 1348	QT450-10/ QT500-7/ QT600-3
Cast Steel	ASTM A27	65-35/ 70-40/ 80-50
	ASTM A148	80-50
	GB/T 11352	ZG230-450/ ZG340-640
	EN 10293	G20Mn5
Anchor Bolts (galvanized)	ISO 898	Gr. 4.8/ 8.8 (galvanized)
	BS 3692	Gr. 4.8/ 8.8 (galvanized)
	ASTM F1554	Gr. 105 (galvanized)

## BOLLARD SELECTION & LAYOUT

Bollards should be designed and laid out according to local standards. Some of the following aspects are to be considered in the design of the berth:

- ✓ Mooring patterns and line types, sizes and angles
- ✓ Changes in draft during loading/unloading of the vessel
- ✓ Wind and current forces
- ✓ Swell, wave and tidal forces
- ✓ Other abnormal environmental loadings

Mooring loads should be calculated where possible, but the following table can be used as an approximate

guideline, also noting that if the berth is expected to experience adverse weather conditions, the bollard capacity should be increased by 25% or greater.

ESC bollards can cope with horizontal angles of  $\pm 90^\circ$  (except for pillar bollards which is in all horizontal angles) and vertical angles up to  $60^\circ$  depending on bollard type.

Design codes recommend that bollards are frequently placed at 15-30m intervals, often at the same spacing as fenders (either at the same point as fenders or midway). Another approximate guide is 15% of the length of the shortest ship.

DISPLACEMENT	APPROX. BOLLARD RATING
Up to 2,000 tons	10 tons
2,000–10,000 tons	30 tons
10,000–20,000 tons	60 tons
20,000–50,000 tons	80 tons
50,000–100,000 tons	100 tons
100,000–200,000 tons	150 tons
Over 200,000 tons	200-300 tons

## COATING SYSTEMS

Exposed to a very corrosive marine environment, bollards require a durable coating system. Standard coating system for a very high corrosive environment are in accordance to BS EN ISO 12944 C5-M. Other high performance paint system, in various colors and thicknesses, can be factory applied on request.

Bollard bodies can also be supplied with hot-dip galvanized (HDG) coating on a special request basis.

Regular maintenance for bollards are needed for wear and abrasion from ropes. Cast steel bollards need frequent painting to retain full strength for it is more susceptible than ductile iron bollard.



SIGNAL YELLOW

SIGNAL BLUE

SIGNAL BLACK

BROWN

MARINE GRAY

SIGNAL RED

Other color options available upon request, please contact ESC for information.

## COLOR OPTIONS



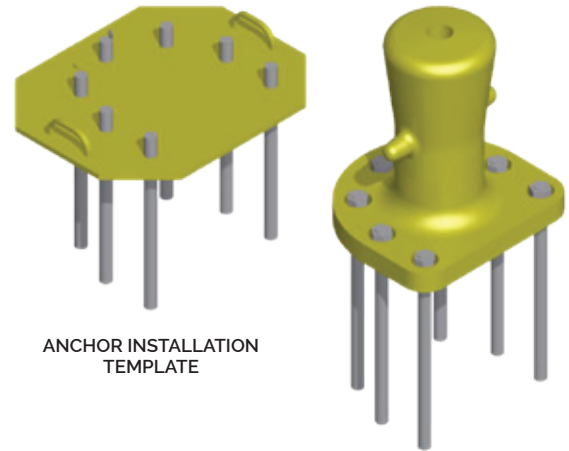


## BOLLARD INSTALLATION

Bollards must be installed correctly for a long and trouble-free service life. Anchors should accurately be installed with a template of the bolting pattern, which ESC can supply on request. Once the grout has cured to full strength, anchors can be tightened to the design preload. A thread loosening compound is frequently applied to allow future removal for replacement. Where possible, recessing the bollard in the concrete is more beneficial than surface mounting.

Fixing options for bollards include:

- ✓ Surface Mounting
- ✓ Recess Mounting
- ✓ Retrofitting
- ✓ Through bolting
- ✓ Structural Steel Mounted



## QUALITY ASSURANCE

Bollards are safety critical items and quality is paramount. Independent third party witnessing of test is available at additional cost on request. A typical quality documentation package will include:

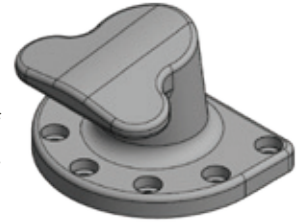
- ✓ Dimensioned drawings of bollard and accessories
- ✓ Bollard and anchorage calculations (if required)
- ✓ Inspection and test plan
- ✓ Certificate of conformance
- ✓ Physical, chemical and material properties report for casting and anchorages
- ✓ Installation guidelines

## T-HEAD BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
10 T	0.75	M20	4
15 T	0.94	M24	5
25 T	1.18	M30	5
30 T	1.18	M30	5
35 T	1.18	M30	6
50 T	1.42	M36	5
80 T	1.65	M42	6
100 T	1.65	M42	7
125 T	1.89	M48	7
150 T	1.89	M48	7
200 T	2.20	M56	8
250 T	2.52	M64	8
300 T	2.52	M64	10

Custom sizes available on request.

ESC's latest generation of T Head Bollards provide a compact high strength bollard system that can be utilised in a multitude of configurations. ESC can offer T head bollards at up to 300 ton capacity in either ductile cast iron or cast steel materials.

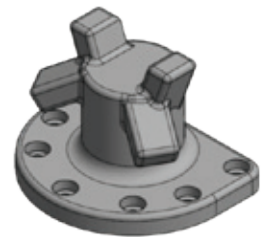


## T-HORN BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
15 T	0.94	M24	5
30 T	1.18	M30	5
50 T	1.42	M36	5
80 T	1.65	M42	6
100 T	1.65	M42	7
150 T	1.89	M48	7
200 T	2.20	M56	8

Custom sizes available on request.

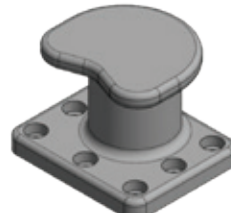
ESC's latest generation of T Horn Bollards provide a compact high strength bollard system that can be utilised in a multitude of configurations. The main feature is that the bollard may carry two mooring lines from different vessels on the same bollard. They are well suited to general purpose berths.



## KIDNEY BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
15 T	0.94	M24	5
30 T	1.18	M30	5
50 T	1.42	M36	5
100 T	1.65	M42	7
150 T	1.89	M48	7
200 T	2.20	M56	8

Custom sizes available on request.



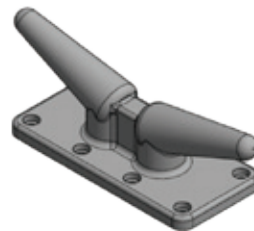
Kidney bollards are well suited for berths with low tidal ranges. ESC's range is for general purpose applications up to 200 tons, from small wharves to large vessel terminals. Kidney bollards are not an optimum body shape for steel line angles.



## CLEAT BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
1 T	0.63	M16	4
5 T	0.79	M20	4
10 T	0.79	M20	6
15 T	0.94	M24	6
20 T	0.94	M24	6
25 T	0.94	M24	6
30 T	0.94	M24	8
35 T	1.18	M30	8

Custom sizes available on request.



Cleat bollards are a low profile bollard well suited for mooring light commercial or recreational vessels in small jetties or marinas. ESC provides cleat bollards in ductile cast iron or cast steel body materials.





## SINGLE BITT BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
10 T	0.94	M24	4
15 T	0.94	M24	4
30 T	1.18	M30	5
50 T	1.42	M36	6
75 T	1.65	M42	6
100 T	1.89	M48	7
150 T	2.20	M56	7
200 T	2.20	M56	8
125 T	1.89	M48	7
150 T	1.89	M48	7
200 T	2.20	M56	8

Custom sizes available on request.

Single Bitt Bollards are well suited for berths with large tidal ranges and for steep mooring angles. This configuration is especially popular in North America and can be utilised simultaneously with multiple mooring lines.

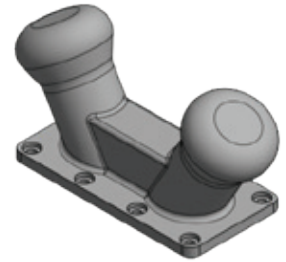


## DOUBLE BITT BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
20 T	0.79	M20	8
30 T	0.87	M22	8
50 T	1.18	M30	8
75 T	1.42	M36	10
100 T	1.65	M42	10
150 T	1.89	M48	10
200 T	2.20	M56	10

Custom sizes available on request.

In some regions, referred to as twin horn bollards, ESC's double bitt bollards offer the feature of accepting multiple mooring lines simultaneously. Their narrow base profile is also an advantageous feature for wharves with limited work areas.

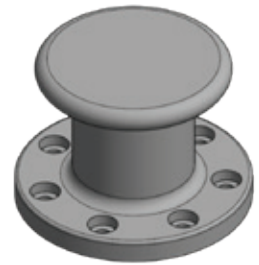


## PILLAR BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
10 T	0.79	M20	4
15 T	0.94	M24	4
30 T	1.42	M36	4
50 T	1.42	M36	4
100 T	1.89	M48	7
150 T	2.20	M56	8
200 T	2.52	M64	8

Custom sizes available on request.

Pillar Bollards are well suited for small tidal range applications and jetties where vessels can berth on both sides due to its capability of handling loads in the full 360° horizontal range.



## PILLAR BOLLARD - JAPANESE DESIGN

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
15 T	1.42	M36	4
25 T	1.89	M48	4
35 T	1.89	M48	6
50 T	2.20	M56	6
70 T	2.52	M64	6
100 T	2.52	M64	8
150 T	3.15	M80	8
200 T	3.54	M90	8

Custom sizes available on request.

These pillar bollards follow a time tested design from the 1970s utilising a lower grade cast steel and anchor material but a larger profile. These exhibit the same design features as ESC's modern pillar bollard design but

are to be recess mounted to reach the design capacity.





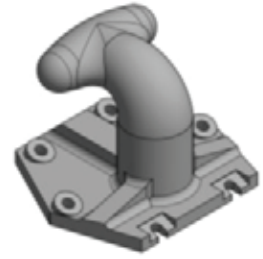
## T-HEAD BOLLARD - JAPANESE DESIGN

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
5 T	0.79	M20	4
10 T	1.06	M27	4
15 T	1.30	M33	4
25 T	1.65	M42	4
30 T	1.65	M42	6
35 T	1.65	M42	6
50 T	1.89	M48	6
70 T	2.20	M56	6
100 T	2.52	M64	6
150 T	2.83	M72	6
200 T	4.72	M120	6

Custom sizes available on request.

ESC has produced heavy duty T-Head bollards—Japanese design for ports around Asia, as a time tested robust design.

These exhibit the same design features as ESC's modern T-Head bollard design but are to be recess mounted to reach the design capacity. The anchor bolts are also orientated at a 22° angle to the vertical.

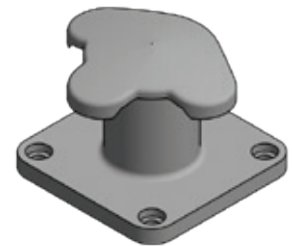


## TRICORN BOLLARD

CAPACITY	BOLTS		BOLTS QUANTITY
	in	mm	
30 T	1.18	M30	4
50 T	1.42	M36	4
100 T	2.05	M52	4
150 T	2.52	M64	4
200 T	2.36	M60	4
250 T	2.68	M68	4
300 T	2.68	M68	4

Custom sizes available on request.

ESC Tricorn Bollards is ideal for any mooring requirement, it is a unique triple-lobed Tricorn Bollard that provides more holding power than any other bollard in its class, even on line angles up to 70°. Its generous trunk diameter reduces mooring line stresses. Integrated load fuses and capacities for up to 3000kN are available.



## PHOTOS



# ESC Product Catalogs

You may download all our product catalogs on this <https://www.escsteel.com/construction-product-catalogs> or request via email: [engineering@escsteel.com](mailto:engineering@escsteel.com). If you are viewing online, you may click on the image below to download.



ESC Capability Statement



Marine & Foundation Piling Catalog



Sheet Pile Installation Manual



Steel Structures Brochure



Trench Shoring Catalog



Vinyl Sheet Pile Catalog



Vinyl Sheet Pile Installation Guide



Port & Offshore Structures Capability Statement



Marine Fender Catalog



Project Case Study - Book I



Project Case Study - Book II



Project Case Study - Book III



Combination Walls Project Case Study



Steel Pipes Projects Case Study

## ESC CAPABILITY STATEMENT

## MARINE & FOUNDATION PILING CATALOG

## SHEET PILE INSTALLATION MANUAL

## STEEL STRUCTURES CAPABILITIES

## TRENCH SHORING CATALOG

## VINYL SHEET PILE CATALOG

## VINYL SHEET PILE INSTALLATION GUIDE

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## ESC PROJECT CASE STUDIES

## COMBINATION WALL PROJECTS

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