

## TECHNICAL FACTFILE

# ANODE ALLOY SELECTION

### ALUMINIUM ANODE ALLOYS

The key feature for good quality aluminium alloys is to manufacture using only high purity aluminium ingot with specified levels of impurities. Impalloy's standard aluminium alloy compositions are given below. Other compositions to customers' particular formulations can also be produced.

#### Chemical Composition (wt%)

Element	IMPALLOY III		IMPALLOY III-S		IMPALLOY III-CW	
	Min%	Max%	Min%	Max%	Min%	Max%
Zn	2.8	6.5	3.0	5.5	4.75	5.75
In	0.010	0.020	0.016	0.040	0.016	0.020
Si		0.12		0.10	0.08	0.12
Fe		0.12		0.09		0.06
Cu		0.006		0.005		0.003
Cd		0.002		0.002		0.002
Ti		0.025		0.02		0.02
Others (each)		0.02		0.02		0.02
Others (total)		0.05		0.05		0.05
Al	remainder		remainder		remainder	

Impalloy III is a general purpose alloy used for relatively short life anodes such as may be used for ships hull and tank anodes.

Impalloy III-S has become widely accepted for use in applications requiring long life such as offshore pipelines, sub-sea structures and marine terminals. This alloy generally conforms to that specified in ISO15589-2 and Norsok M-503.

Impalloy III-CW is commonly specified by some Oil & Gas Operators for use in deepwater applications.

Impalloy will be pleased to advise on alloy selection for individual applications. Alternatively, we can manufacture formulations to customer specifications.



## ZINC ANODE ALLOYS

### Chemical Composition (wt%)

Element	US MIL A-18001K ASTM B 418 Type I		ASTM B 418 Type II	
	Min%	Max%	Min%	Max%
Al	0.1	0.5		0.005
Cd	0.025	0.07		0.003
Fe		0.005		0.0014
Pb		0.006		0.003
Cu		0.005		0.002
Others (total)		0.10		
Zn	remainder		remainder	

US MIL A-18001K is the internationally accepted and preferred alloy for general use in sea water, brackish waters and other saline solutions. It may also be used in low resistivity, salt-laden sediments and soils. This alloy is used in Impalloy's C-SENTRY range of anodes for the marine industry.

The ASTM Type II alloy is more appropriately used for anodes in potable waters and in other environments.

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### Agency

**CAT<sup>+</sup> MINH**

TECHNOLOGY EQUIPMENT CO., LTD

SINCE 2000

Director : Mr. Nguyen Thanh Vinh

Hotline : 0903 1800 99

Fax : (+84 28) 6258 3348

Email : vinh@catminh.com

Office : Tedi Bulding, No 15A, Hoang Hoa Tham Street,  
Ward 6, Binh Thanh District, Ho Chi Minh, Viet Nam

[www.vietnamdiving.net](http://www.vietnamdiving.net)



# IMPALLOY

## MARINE TECHNICAL FACTFILE

### ALUMINIUM HULL ANODES



ANODE TYPE	OVERALL DIMENSIONS mm			ANODE BODY mm			WEIGHTS (KG)	
	LENGTH	WIDTH	DEPTH	LENGTH	WIDTH	DEPTH	NET	GROSS
13XH	254	102	38	152	102	38	1.3	1.6
28XH	394	127	32	318	127	32	2.8	3.5
36XH	457	152	32	355	152	32	3.6	4.5
63XH	826	85	49	610	85	49	6.3	7.8
76XH	826	102	49	610	102	49	7.6	9.1
93XH	826	140	43	610	140	43	9.3	10.8
124XH	826	138	65	605	138	65	12.4	13.9
200XH	826	286	80	83	133	80	20.0	22.5
320XH	1422	152	64	1219	152	64	32.0	35.4
352XH	1435	175	65.5	1219	175	65.5	35.2	38.6

All weights and dimensions are nominal subject to variation in material densities.  
Anodes available in various configurations by special order.

### ZINC HULL ANODES



ANODE TYPE	OVERALL DIMENSIONS mm			ANODE BODY mm			WEIGHTS (KG)	
	LENGTH	WIDTH	DEPTH	LENGTH	WIDTH	DEPTH	NET	GROSS
28ZH	238	83	41	171	83	41	2.8	2.9
41ZH	381	76	38	305	76	38	4.1	4.5
55ZH	440	90	40	330	90	40	5.5	6.1
86ZH	458	152	32	356	152	32	8.6	9.6
141ZH	557	100	62	457	100	62	14.1	15.0
164ZH	826	85	49	610	85	49	16.4	15.0
186ZH	811	203	38	811	101	38	18.6	20.0
187ZH	911	203	38	811	102	38	18.7	20.0
202ZH	826	102	49	610	102	49	20.0	21.7
246ZH	826	140	43	610	140	43	24.6	26.1
285ZH	913	203	63.5	813	102	63.5	28.5	30.0

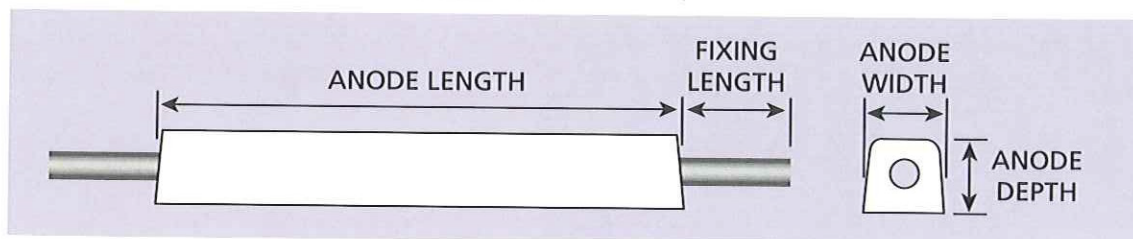
All weights and dimensions are nominal subject to variation in material densities.  
Anodes available in various configurations by special order.

For standard alloy compositions, please see the separate Anode Alloy Selection data sheet.

Impalloy will be pleased to advise on alloy selection for individual applications.  
Alternatively, we can manufacture formulations to customer specifications.



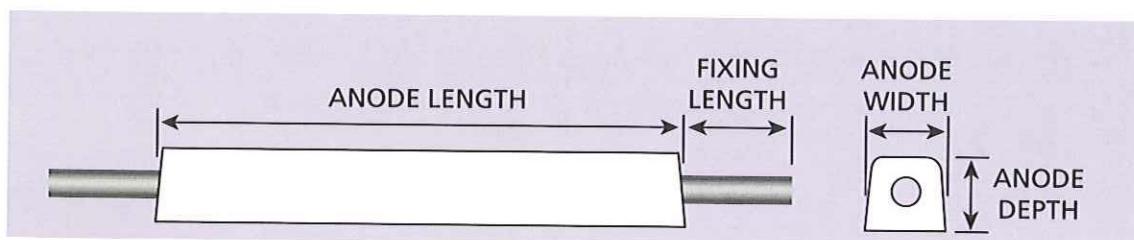
## ALUMINIUM TANK ANODES



ANODE TYPE	Anode Length mm	Fixing Length mm	Anode Width mm	Anode Depth mm	Core Diameter mm	Net Weight kg	Gross Weight kg
NT							
81	1197	227	51	51	12	8.1	9.6
102	1508	227	51	51	12	10.2	12.0
116	1225	227	60	60	12	11.6	13.1
132	1504	227	54	62	12	13.2	15.0
160	1478	227	64	64	12	16.0	17.7
188	1223	227	76	76	12	18.8	20.3

All weights and dimensions are nominal subject to variation in material densities.  
Anodes available in various configurations by special order.

## ZINC TANK ANODES



ANODE TYPE	Anode Length mm	Fixing Length mm	Anode Width mm	Anode Depth mm	Core Diameter mm	Net Weight kg	Gross Weight kg
ZT							
94ZT*	227	227	51	51	12	9.4	10.3
212ZT	1213	227	51	51	12	21.2	22.7
304ZT	1244	227	60	60	12	30.4	31.9
318ZT	1175	227	63	63	12	31.8	33.3
450ZT	1133	227	76	76	12	45.0	46.4
500ZT	1493	227	70	70	12	50.0	51.8

All weights and dimensions are nominal subject to variation in material densities.  
Anodes available in various configurations by special order.

For standard alloy compositions, please see our separate Anode Alloy Selection data sheet.  
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Anodes produced with straight, double cranked or "cow-horn" inserts, either 90° or 45° bend.



Agency  
**CAT MINH**  
TECHNOLOGY EQUIPMENT CO.,LTD  
SINCE 2000

Director : Mr. Nguyen Thanh Vinh  
Hotline : 0903 1800 99  
Fax : (+84 28) 6258 3348  
Email : vinh@catminh.com

Office : Tedi Bulding, No 15A, Hoang Hoa Tham Street,  
Ward 6, Binh Thanh District, Ho Chi Minh, Viet Nam  
[www.vietnamdiving.net](http://www.vietnamdiving.net)

A large-scale photograph of an offshore wind farm. In the foreground, a single wind turbine stands prominently on the left, its three blades reaching towards the sky. A long, straight line of many more turbines extends from the middle ground into the distance, receding towards the horizon. The sea is dark and textured with small waves, and the sky is a pale, hazy blue. The overall scene conveys a sense of vastness and industrial scale.

**IMPALLOY**

**TECHNICAL FACTFILE**

# OFFSHORE WINDFARMS

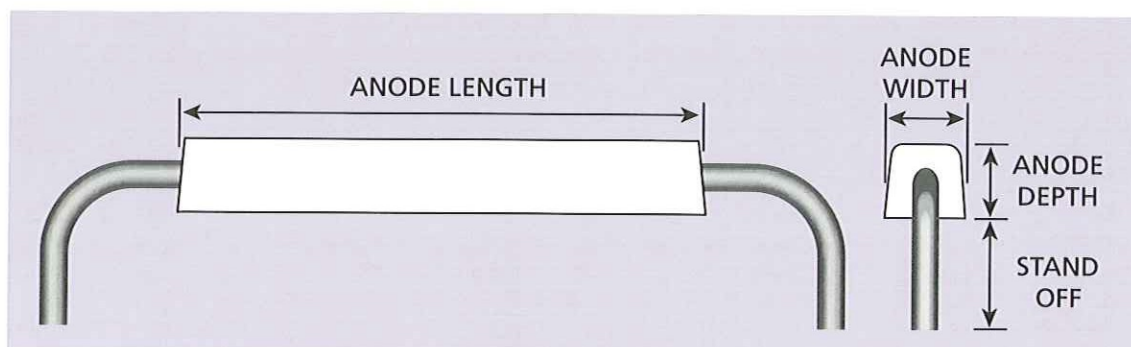
Wind energy is the fastest growing source of electricity generation in the world today. Impalloy technology, thanks to its outstanding marine track record, is at the forefront of providing offshore wind turbine foundations with critical protection against corrosion.



## STAND-OFF ALUMINIUM ANODES

Standard production anodes of trapezoidal cross section with round-bar or tubular steel inserts.

Anodes of other net weights may be produced by adjusting the casting length or selecting alternative insert geometry.



ANODE TYPE	Mean Length mm	Mean Width mm	Depth mm	Insert Diameter mm		Alloy net wt kg	Alloy unit net wt kg/m
				Tube o.d. mm	tubular nom. Bore		
1600XP	2600	170	170	88.9	3"	160	61.5
2020XP	2500	190	190	88.9	3"	202	80.8
1750XP	2500	190	190	114.3	4"	175	70.0
2400XP	2622	210	210	114.3	4"	240	91.5
3000XP	2745	225	225	114.3	4"	300	109.3
3300XP	2372	252	244	114.3	4"	330	139.1
4350XP	2910	254	257	114.3	4"	435	149.5
5650XP	2973	283	283	114.3	4"	565	190.0

Anodes produced with straight or "cow-horn" inserts

Anode sizes and insert designs can also be custom made to customers' particular requirements.





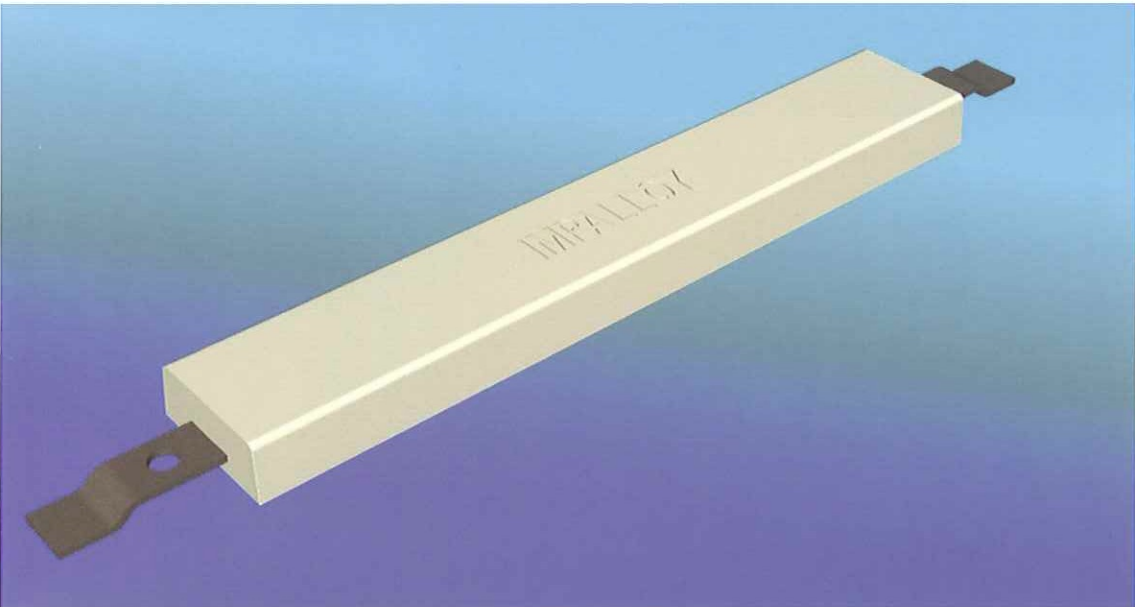
## FLUSH MOUNTED ALUMINIUM ANODES

Most of the stand-off anode sizes may also be manufactured as flush mounted anodes with suitable insert design.

Standard production anodes.

ANODE TYPE	Mean Length mm	Mean Width mm	Depth mm	Insert mm		Alloy net wt kg	Anode gross wt kg/m
				flat bar	overall length		
202XH	838	133	80	50 x 6	1038	20.2	22.7
320XH	1219	152	64	50 x 6	1435	32.0	35.4
352XH	1159	175	65	50 x 6	1435	35.2	38.5
681XH	1515	133	127	40 x 8	1715	68.1	72.4

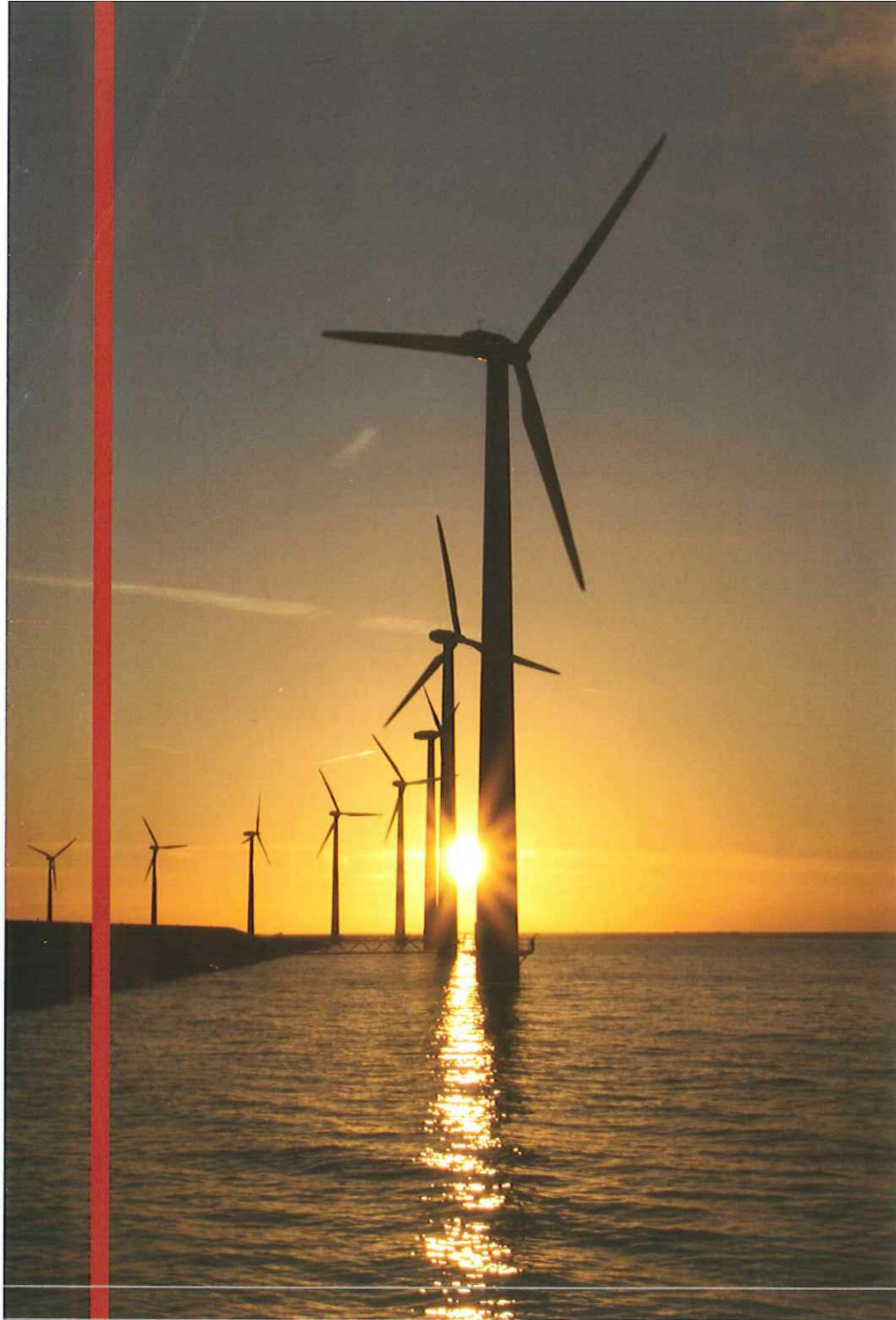
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**CAT<sup>■</sup>MINH**

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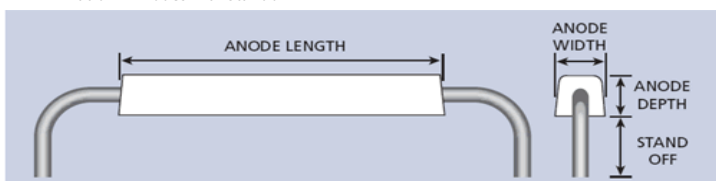


Data shown below the insert section is the weight per metre in Kg

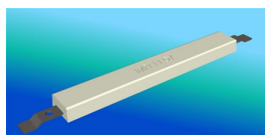
														Flat bar											
					Round bar				Tube					5		5	10	5	8	6	6	6	6		
WIDTH	HEIGHT	LENGTH	No of MOULDS	Insert dia	6	8	10	12	20	25	60.3	73	114.3	30	40	50	60	70	80	100					
33	30	1760	5		2.6	2.6	2.5	2.4																	
40	40	1530	1		4.3	4.2	4.2	4.1																	
42	42	1360	13		4.7	4.7	4.6	4.5																	
50	65	1375	5		8.8	8.7	8.7	8.6																	
51	51	1210	9		7.0	7.0	6.9	6.8																	
51	51	1620	10		7.0	7.0	6.9	6.8																	
51	51	2070	1		7.0	7.0	6.9	6.8																	
55	60	1130	19				8.8	8.7	8.2																
60	60	1660	4				9.6	9.5	9.0																
60	60	1715	2				9.6	9.5	9.0																
60	75	1155	11				12.1	12.0	11.4	10.9															
65	65	1580	11				11.2	10.7	10.2																
65	65	1110	5				11.2	10.7	10.2																
65	70	1520	5				12.1	11.6	11.1																
65	95	1210	2				16.5	16.0	15.5																
70	70	1570	3				13.1	12.5	12.0																
75	75	1510	12				15.0	14.5	14.0																
80	95	1000	1				20.4	19.9	19.4																
85	85	1410	2				19.4	18.9	18.4																
90	90	1400	3				21.8	21.3	20.8																
90	90	2825	4				21.8	21.3	20.8																
101	101	2525	4								20.1														
101	101	1905	4								20.1														
101	101	2020	4								20.1														
101	101	3020	10								20.1														
105	105	2525	1								22.3														
114	114	2240	5								27.7														
114	114	2520	1								27.7														
120	105	1170	4								26.6														
120	120	1430	2								31.5														
132	127	1865	2								38.0														
132	127	2480	5								38.0														
132	127	1865	1								38.0														
135	135	1710	2								42.0														
143	143	2190	2								48.0	44.4													
145	160	2830	2								55.5	51.9													
155	60	1980	4								17.6	14.0													
160	160	2650	3								62.1	58.5	41.9												
160	165	1325	1								64.3	60.6	44.1												
164	164	2590	3								65.6	62.0	45.4												
170	170	2770	3								71.1	67.5	50.9												
175	65	1510	4								23.3	19.6	3.0												
180	105	2285	3								43.8	40.2	23.6												
180	185	1545	2								83.1	79.5	62.9												
185	160	2660	3								73.0	69.4	52.8												
185	160	1720	2								73.0	69.4	52.8												
185	165	1725	1								75.5	71.9	55.3												
190	190	3260	5								90.8	87.1	70.5												
200	115	2130	1								55.0	51.4	34.8												
210	180	3360	1								95.4	91.8	75.2												
210	210	1340	4								112.6	109.0	92.4												
210	210	2995	5								112.6	109.0	92.4												
210	215	3150	6								115.5	111.8	95.2												
215	195	2600	1								106.7	103.0	86.4												
215	215	3025	1								118.4	114.8	98.2												
215	220	3030	5								121.3	117.7	101.1												
225	225	3170	7								130.4	126.8	110.2												
225	230	3180	3								133.5	129.8	113.3												
230	230	3140	3								136.6	133.0	116.4												
235	235	3000	1								143.0	139.3	122.7												
240	240	3330	3								149.5	145.8	129.2												
250	250	2340	1								162.8	159.2	142.6												
250	250	2685	2								162.8	159.2	142.6												
250	250	3320	2								162.8	159.2	142.6												
250	250	3030	1								162.8	159.2	142.6												
250	250	3030	3								162.8	159.2	142.6												
255	240	3320	2								159.3	155.6	139.1												
255	250	3320	1								166.2	162.6	146.0												
255	250	2690	2								166.2	162.6	146.0												
255	270	3340	1								180.2	176.5	159.9												
260	250	2710	1								169.7	166.0	149.4												
260	260	2450	1								176.8	173.1	156.5												
260	260	1765	1								176.8	173.1	156.5												
260	260	3350	2								176.8	173.1	156.5												
270	250	2750	1								176.5	172.8	156.3												
270	270	2765	1								191.2	187.6	171.0												
305	150	1390	4								117.1	113.5	96.9												
320	320	2690	1								271.8	268.1	251.5												

Anodes can be designed to using above cross section s and the weight per metre depending on the insert type selected.

Platform Anodes with Standoff



Flush Mount



Tank anode

