

**PAUL R. KOTZEBUE, PE**  
MECHANICAL ENGINEER \* ENCINITAS, CA

K-28 Weight Estimate Notes

1. Origin is at Station 0, centerline, and 1200 DWL.
2. LCG is meters aft of origin. TCG is meters to starboard of origin (distances to port are negative). VCG is meters above origin (distances below 1200 DWL are negative).
3. Weights are kilograms.
4. The weight estimate calculation that follows is for reference purposes only and may not be representative of the final weight estimate of the vessel.



**WEIGHT ESTIMATE**

Vessel: K-28 15 Square Meter			Rev:	B		
<b>STRUCTURE</b>		Kg	Tonnes	LCG	TCG	VCG
	Subtotal	445	0.45	3.32	0.00	0.10
	Margin = 10.0%	45	0.04			
	<b>Total</b>	<b>490</b>	<b>0.49</b>	<b>3.32</b>	<b>0.00</b>	<b>0.10</b>
Item	Qty	Unit Wt	Weight	LCG	TCG	VCG
Hull Shell	14.43	10.50	152	3.25	0.00	0.15
Bottom Reinforcement	6.05	15.73	95	3.39	0.00	-0.40
Keel Flat	0.08	21.00	2	3.59	0.00	-1.15
Bulkheads and Panels	4.55	5.00	23	2.55	0.00	0.13
Main Bulkhead	1.00	6.00	6	2.50	0.00	0.19
Bonding	23.50	0.44	10	2.54	0.00	0.14
Hull/Deck Joint	17.46	0.39	7	3.31	0.00	0.56
Deck and Cockpit	9.83	6.63	65	3.51	0.00	0.52
Hatch Flat	2.07	13.37	28	3.41	0.00	0.63
Floors	3.00	1.51	5	3.50	0.00	-0.40
Rudder Stock	1.16	9.72	11	5.64	0.00	0.12
Rudder Blade	1.00	5.50	6	5.83	0.00	-0.42
Bow Tank Foam	0.24	32.00	8	1.43	0.00	-0.26
Sheer Clamp	17.66	0.38	7	3.30	0.00	0.56
Transverse Frames	6.67	1.51	10	3.50	0.00	0.01
Chainplate Reinforcement	1.60	5.25	8	2.75	0.00	0.05
Deck Reinforcement	0.76	5.25	4	2.75	0.00	0.54

**WEIGHT ESTIMATE**

Vessel: K-28 15 Square Meter			Rev:	B		
<b>RIG AND HARDWARE</b>		Kg	Tonnes	LCG	TCG	VCG
	Subtotal	93	0.09	3.02	0.00	1.81
	Margin = 5.0%	5	0.00			
	<b>Total</b>	<b>98</b>	<b>0.10</b>	<b>3.02</b>	<b>0.00</b>	<b>1.81</b>
<b>Item</b>	<b>Qty</b>	<b>Unit Wt</b>	<b>Weight</b>	<b>LCG</b>	<b>TCG</b>	<b>VCG</b>
Mast	8.38	1.90	16	2.69	0.00	5.12
Boom	2.36	1.37	3	3.80	0.00	1.63
Spreaders	1.60	0.61	1	2.79	0.00	4.00
Shrouds and Stays	37.31	0.11	4	2.78	0.00	3.56
Turnbuckles	6.00	0.23	1	3.19	0.00	0.68
Chainplates	4.00	0.50	2	3.19	0.00	0.65
Running Rigging	95.00	0.07	7	3.68	0.00	1.18
Mainsail	8.93	0.26	2	3.51	0.00	4.11
100% Genoa	7.12	0.28	2	1.86	0.00	2.88
Primary Winches	2.00	1.40	3	3.37	0.00	0.82
Boom Vang	1.00	4.44	4	2.96	0.00	1.24
Mainsheet	1.00	3.20	3	4.35	0.00	1.01
Spinnaker Pole	1.00	4.99	5	1.46	0.00	0.63
Genoa Track / Cars	2.00	0.77	2	2.87	0.00	0.60
Misc Hardware	1.00	20.34	20	3.48	0.00	0.55
Extra Sails	2.00	2.00	4	1.70	0.00	0.34
Bow Pulpit	1.00	2.35	2	-0.25	0.00	0.90
Stern Pulpit	1.00	2.35	2	6.91	0.00	0.84
Stanchions	6.00	0.75	5	3.48	0.00	0.71
Lifelines	24.80	0.05	1	3.33	0.00	0.91
Toe Rail	3.90	0.65	3	1.31	0.00	0.60

**WEIGHT ESTIMATE**

Vessel:		K-28 15 Square Meter			Rev:	B
<b>ELECTRICAL AND MECHANICAL</b>		Kg	Tonnes	LCG	TCG	VCG
	Subtotal	85	0.08	3.92	0.00	0.13
Margin =	5.0%	4	0.00			
	<b>Total</b>	<b>89</b>	<b>0.09</b>	<b>3.92</b>	<b>0.00</b>	<b>0.13</b>
Item	Qty	Unit Wt	Weight	LCG	TCG	VCG
Batteries	2.00	25.00	50	3.79	0.00	-0.12
Navigation Lights	1.00	0.55	1	2.86	0.00	9.55
Cabin Lights	1.00	0.01	0	2.70	0.00	0.81
Switch Panel	1.00	0.45	0	2.50	0.00	0.39
Battery Wiring	6.50	0.07	0	3.24	0.00	0.22
Mast Wiring	19.00	0.02	0	2.80	0.00	4.50
DC Wiring	6.00	0.02	0	2.93	0.00	0.61
Instruments	2.00	1.70	3	2.90	0.00	0.32
Misc Electrical	1.00	5.00	5	3.40	0.00	0.40
Tiller	1.00	1.00	1	4.90	0.00	0.65
Tiller Head	1.00	3.00	3	5.35	0.00	0.59
Rudder Bearings	2.00	1.00	2	5.10	0.00	0.24
Bilge Pump	1.00	1.00	1	5.12	0.00	0.42
Portable Pump	1.00	1.22	1	5.19	0.00	0.13
Bilge Pump Piping	1.00	16.00	16	4.19	0.00	0.17

**WEIGHT ESTIMATE**

Vessel: K-28 15 Square Meter			Rev:	B		
<b>OUTFIT</b>		Kg	Tonnes	LCG	TCG	VCG
	Subtotal	62	0.06	3.78	0.00	0.21
	Margin = 10.0%	6	0.01			
	<b>Total</b>	<b>68</b>	<b>0.07</b>	<b>3.78</b>	<b>0.00</b>	<b>0.21</b>
<b>Item</b>	<b>Qty</b>	<b>Unit Wt</b>	<b>Weight</b>	<b>LCG</b>	<b>TCG</b>	<b>VCG</b>
Life Jackets	4.00	1.00	4	1.89	0.00	0.31
Life Ring and Throw Line	1.00	3.20	3	6.36	0.00	0.77
Flares	2.00	1.40	3	3.00	0.00	0.22
Horn	1.00	1.00	1	3.00	0.00	0.22
First Aid Kit	1.00	1.00	1	3.00	0.00	0.22
Anchor and Rode	1.00	17.20	17	5.25	0.00	0.18
Fenders	2.00	1.10	2	5.50	0.00	0.18
Dock Lines	18.00	0.25	5	5.50	0.00	0.18
Flashlights	2.00	0.50	1	3.00	0.00	0.22
Tool Set	1.00	9.10	9	3.00	0.00	0.22
VHF Radio	1.00	1.63	2	3.00	0.00	0.22
Compass	1.00	1.10	1	3.50	0.00	0.68
Cushion	2.06	5.37	11	1.65	0.00	0.08
Ice Chest (empty)	1.00	2.27	2	3.37	0.00	-0.08

**WEIGHT ESTIMATE**

Vessel: K-28 15 Square Meter				Rev:	B		
<b>LIGHT SHIP</b>		Kg	Tonnes	LCG	TCG	VCG	
	Subtotal	1176	1.18	3.41	0.00	-0.11	
	Margin = 2.0%	24	0.02			0.050	
	<b>Total</b>	1200	<b>1.20</b>	<b>3.41</b>	<b>0.00</b>	<b>-0.055</b>	
<b>Item</b>	<b>Weight</b>	<b>LCG</b>	<b>L.MOM</b>	<b>TCG</b>	<b>T.MOM</b>	<b>VCG</b>	<b>V.MOM</b>
STRUCTURE	490	3.32	1628	0.00	0	0.10	50
RIG HDW	98	3.02	295	0.00	0	1.81	177
ELEC MECH	89	3.92	348	0.00	0	0.13	11
OUTFIT	68	3.78	258	0.00	0	0.21	14
TANKS	0	0.00	0	0.00	0	0.00	0
Additional Items:							
BALLAST	432	3.42	1479	0.00	0	-0.87	-376

**WEIGHT ESTIMATE**

Vessel: K-28 15 Square Meter				Rev:	B	
<b>CONSUMABLES</b>						
Item	Qty	Unit Wt	Weight	LCG	TCG	VCG
FUEL:						
WATER:						
SEWAGE:						
LUBE OIL:						
Crew and effects	3.00	84.00	252	4.00	0.00	0.75
Galley stores	1.00	12.00	12	3.37	0.00	-0.05

**WEIGHT ESTIMATE**

Vessel:		K-28 15 Square Meter			Rev:	B		
<b>MIN SAILING COND</b>			Kg	Tonnes	LCG	TCG	VCG	
		Subtotal	1284	1.28	3.45	0.00	0.00	
	Margin =	0.0%	0	0.00				
		<b>Total</b>	1284	<b>1.28</b>	<b>3.45</b>	<b>0.00</b>	<b>-0.003</b>	
<b>Item</b>	<b>%</b>	<b>Weight</b>	<b>LCG</b>	<b>L.MOM</b>	<b>TCG</b>	<b>T.MOM</b>	<b>VCG</b>	<b>V.MOM</b>
LIGHT SHIP		1200	3.41	4088	0.00	0	-0.06	-67
FUEL:								
WATER:								
SEWAGE:								
LUBE OIL:								
Crew and effects	33	84	4.00	336	0.00	0	0.75	63
Galley stores	0	0	3.37	0	0.00	0	-0.05	0
<b>MISSION LOADS:</b>								
Autopilot		0.00	4.82	0	0.00	0	0.63	0
Mini Galley		0.00	2.56	0	0.00	0	0.40	0
Misc Stores		0.00	3.75	0	0.00	0	0.05	0
EPIRB		0.00	2.62	0	0.00	0	0.41	0
Liferaft		0.00	4.85	0	0.00	0	0.38	0

**WEIGHT ESTIMATE**

Vessel:		K-28 15 Square Meter			Rev:	B		
<b>HALF LOAD</b>			Kg	Tonnes	LCG	TCG	VCG	
		Subtotal	1380	1.38	3.48	0.00	0.04	
	Margin =	0.0%	0	0.00				
		<b>Total</b>	<b>1380</b>	<b>1.38</b>	<b>3.48</b>	<b>0.00</b>	<b>0.044</b>	
Item	%	Weight	LCG	L.MOM	TCG	T.MOM	VCG	V.MOM
LIGHT SHIP		1200	3.41	4088	0.00	0	-0.06	-67
FUEL:								
WATER:								
SEWAGE:	50							
LUBE OIL:								
Crew and effects	67	169	4.00	675	0.00	0	0.75	127
Galley stores	50	6	3.37	20	0.00	0	-0.05	0
<b>MISSION LOADS:</b>								
Autopilot		0.00	4.82	0	0.00	0	0.63	0
Mini Galley		0.00	2.56	0	0.00	0	0.40	0
Misc Stores		5.00	3.75	19	0.00	0	0.05	0
EPIRB		0.00	2.62	0	0.00	0	0.41	0
Liferaft		0.00	4.85	0	0.00	0	0.38	0

**WEIGHT ESTIMATE**

Vessel:		K-28 15 Square Meter			Rev:	B		
<b>FULL LOAD</b>			Kg	Tonnes	LCG	TCG	VCG	
		Subtotal	1485	1.49	3.52	0.00	0.09	
	Margin =	0.0%	0	0.00				
		<b>Total</b>	<b>1485</b>	<b>1.49</b>	<b>3.52</b>	<b>0.00</b>	<b>0.086</b>	
Item	%	Weight	LCG	L.MOM	TCG	T.MOM	VCG	V.MOM
LIGHT SHIP		1200	3.41	4088	0.00		-0.06	-67
FUEL:								
WATER:								
SEWAGE:								
LUBE OIL:								
Crew and effects	100	252	4.00	1008	0.00	0	0.75	189
Galley stores	100	12	3.37	40	0.00	0	-0.05	-1
MISSION LOADS:								
Autopilot		2.27	4.82	11	0.00	0	0.63	1
Mini Galley		0.68	2.56	2	0.00	0	0.40	0
Misc Stores		10.00	3.75	38	0.00	0	0.05	1
EPIRB		0.70	2.62	2	0.00	0	0.41	0
Liferaft		7.70	4.85	37	0.00	0	0.38	3