TUG AND SALVAGE POWER SOLUTIONS

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CAT

Caterpillar follows a policy of continuous product improvement. For this reason, some material and specifications in the Tug and Salvage Solutions Guide could change without notice.

For more Information about Caterpillar Marine and current products, as well as legacy products, please visit:
www.cat.com/marine

PUSH AHEAD

FULLY INTEGRATED TUG SYSTEMS TO OPTIMIZE PERFORMANCE

Handle the heaviest loads in the toughest conditions with Caterpillar's fully integrated power and propulsion systems. Whether in the harbor or at your terminal, we have everything you need to boost efficiency and keep your cost at the minimum.

Our dependable high-speed engines are most suitable for vessels with variable power needs in terms of acceleration, bollard pull and maneuverability. And, our medium-speed engines (heavy-fuel oil, marine diesel and dual fuel engines) are ideal for heavy-duty operations and higher average loads.

Together with our top-of-the-line azimuth thrusters and control systems, we supply you with complete propulsion packages from one single source.

This guide refers to harbor and terminal tugs equipped with azimuth thrusters. The following pages present propulsion packages for various ranges of bollard pull. These are examples of how to reach a certain bollard pull. The same performance can be obtained with other combinations of engine power, electric motor power and thruster selections.

For more information on fully integrated propulsion systems, please refer to:

- **MARINE POWER SOLUTIONS** guide (LEDM3457) for additional ratings
- **THE HERO OF THE HARBOR** – (LEDM0129) for fully integrated tug systems to optimize performance.

STANDARD DIESEL PROPULSION PACKAGES

All bollard pull values stated below are for ahead pull direction. For astern pull direction, the bollard pull is normally lower and the reduction is vessel design dependent.

Cat high-speed engines

Engine type	Power per engine	Total tug power	Max. engine speed	Thruster	Propeller diameter	Predicted ship bollard pull	
	[kW]	[kW]	[rpm]		[mm]	[metric ton]*	[short ton]*
C32	970	1940	1800	2 x MTA318 02	1850	31-33	34-36
C32	1081	2162	2000	2 x MTA318 02	1850	34-36	37-39
3512	1230	2460	1800	2 x MTA420 02	2050	40-42	44-46
3512	1500	3000	1600	2 x MTA420 02	2050	44-47	49-52
3512	1500	3000	1600	2 x MTA524 03	2400	52-54	57-60
3512	1765	3530	1800	2 x MTA524 03	2400	58-60	64-66
3512	1902	3804	1800	2 x MTA524 03	2400	60-62	66-68
3516	1920	3840	1600	2 x MTA524 03	2400	61-63	67-69
3516	2000	4000	1600	2 x MTA524 03	2400	63-65	69-72
3516	2240	4480	1800	2 x MTA627 03	2700	74-77	82-85
3516	2350	4700	1800	2 x MTA627 03	2700	76-79	84-87
3516	2240	4480	1800	2 x MTA628 03	2800	75-78	83-86
3516	2525	5050	1800	2 x MTA628 03	2800	80-83	87-92

* Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures are indicative and final thrust will depend on vessel design and bollard pull conditions.

STANDARD DIESEL PROPULSION PACKAGES

Cat medium-speed engines

Engine type	Power per engine	Total tug power	Max. engine speed	Thruster	Propeller diameter	Predicted ship bollard pull	
	[kW]	[kW]	[rpm]		[mm]	[metric ton]*	[short ton]*
C280-6	1730	3460	900	2 x MTA524 02	2400	56-58	62-64
C280-6	1850	3700	1000	2 x MTA524 02	2400	58-60	64-66
C280-6	1900	3800	900	2 x MTA524 02	2400	59-61	65-67
C280-6	2030	4060	1000	2 x MTA627 02	2700	68-71	71-75
C280-8	2300	4600	900	2 x MTA627 02	2700	73-76	81-84
C280-8	2460	4920	1000	2 x MTA730 02	3000	83-86	92-95
C280-8	2530	5060	900	2 x MTA730 02	3000	85-88	94-97
C280-8	2710	5420	1000	2 x MTA730 02	3000	88-91	97-100

* Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures are indicative and final thrust will depend on vessel design and bollard pull conditions.

MaK medium-speed engines

Engine type	Power per engine	Total tug power	Max. engine speed	Thruster	Propeller diameter	Predicted ship bollard pull	
	[kW]	[kW]	[rpm]		[mm]	[metric ton]*	[short ton]*
6 M 20 C	1200	2400	1000	2 x MTA420 02	2050	39-41	43-45
8 M 20 C	1600	3200	1000	2 x MTA524 02	2400	53-55	58-60
9 M 20 C	1800	3600	1000	2 x MTA524 02	2400	57-59	63-65
6 M 25 C	2000	4000	750	2 x MTA627 02	2700	67-69	74-76
6 M 25 E	2100	4200	750	2 x MTA627 02	2700	69-71	76-78
8 M 25 C	2666	5332	750	2 x MTA730 02	3000	87-90	96-99
8 M 25 E	2800	5600	750	2 x MTA730 02	3000	89-92	98-101
9 M 25 C	3000	6000	750	2 x MTA834 02	3400	103-106	113-117
9 M 25 E	3150	6300	750	2 x MTA834 02	3400	106-110	117-121

* Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures are indicative and final thrust will depend on vessel design and bollard pull conditions.

HYBRID PROPULSION PACKAGES

Cat high-speed engines

Engine type	Power per engine	Power per electr. motor	Total tug power	Max. engine speed	Thruster	Propeller diameter	Predicted ship bollard pull	
	[kW]	[kW]	[kW]	[rpm]		[mm]	[metric ton]*	[short ton]*
C32	1081	450	3062	2100	2 x MTA521 03	2100	48-50	53-55
C32	1081	450	3062	2100	2 x MTA521 03	2400	53-55	59-61
3512	1230	560	3580	1800	2 x MTA524 03	2400	59-61	65-67
3512	1500	500	4000	1600	2 x MTA524 03	2400	63-65	69-72
3512	1500	500	4000	1600	2 x MTA627 03	2700	69-71	76-79
3512	1765	500	4530	1800	2 x MTA627 03	2700	75-77	82-85
3512	1902	560	4924	1800	2 x MTA628 03	2800	79-82	87-90
3512	1902	560	4924	1800	2 x MTA730 02	3000	83-86	92-95
3516	2240	560	5600	1800	2 x MTA730 02	3000	89-92	98-102
3516	2100	560	5320	1600	2 x MTA834 02	3400	94-97	103-107
3516	2240	560	5600	1800	2 x MTA834 02	3400	98-101	107-111

* Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures are indicative and final thrust will depend on vessel design and bollard pull conditions.

Cat medium-speed engines

Engine type	Power per engine	Power per electr. motor	Total tug power	Max. engine speed	Thruster	Propeller diameter	Predicted ship bollard pull	
	[kW]	[kW]	[kW]	[rpm]		[mm]	[metric ton]*	[short ton]*
C280-6	1730	560	4580	900	2 x MTA627 02	2700	73-76	81-84
C280-6	1730	560	4580	900	2 x MTA730 02	3000	79-82	87-91
C280-6	1900	560	4920	900	2 x MTA730 02	3000	83-86	91-95
C280-8	2300	450	5500	900	2 x MTA730 02	3000	88-91	97-100
C280-6	2030	560	5180	1000	2 x MTA834 02	3400	92-95	101-105
C280-8	2300	560	5720	900	2 x MTA834 02	3400	99-102	109-113

* Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures are indicative and final thrust will depend on vessel design and bollard pull conditions.

HYBRID PROPULSION PACKAGES

MaK medium-speed engines

Engine type	Power per engine	Power per electr. motor	Total tug power	Max. engine speed	Thruster	Propeller diameter	Predicted ship bollard pull	
	[kW]	[kW]	[kW]	[rpm]		[mm]	[metric ton]*	[short ton]*
6 M 20 C	1080	560	3280	900	2 x MTA524 02	2400	53-55	59-61
8 M 20 C	1360	560	3840	900	2 x MTA524 02	2400	59-61	65-67
8 M 20 C	1360	560	3840	900	2 x MTA627 02	2700	65-67	72-74
8 M 20 C	1520	560	4160	1000	2 x MTA627 02	2700	68-70	75-78
6 M 25 C	1740	560	4600	720	2 x MTA627 02	2700	73-76	80-83
9 M 20 C	1710	560	4540	720	2 x MTA730 02	3000	79-82	87-90
6 M 25 C	2000	450	4900	750	2 x MTA730 02	3000	82-85	91-94
8 M 25 C	2320	450	5540	720	2 x MTA730 02	3000	89-92	98-101
6 M 25 E	2100	560	5320	750	2 x MTA834 02	3400	94-97	104-107
8 M 25 C	2320	450	5540	720	2 x MTA834 02	3400	97-100	107-110

* Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures are indicative and final thrust will depend on vessel design and bollard pull conditions.

BOLLARD PULL

The widely used performance indicator for any towing vessel is the bollard pull thrust and it is a measure of the real-life usefulness of a towing boat. The bollard pull is the force that is measured in a tow line from the towing vessel connecting to a bollard while the vessel is stationary and full power is applied to the propulsion system.

Major factors affecting the bollard pull are power, propeller diameter and vessel design.

Bollard pull is measured during a bollard pull trial. To get reliable measurement results, the measurements must be conducted with certain conditions fulfilled. For instance, the water depth must be above a minimum value and the length of the tow line must be above a minimum value. Bollard pull is measured either in metric tons or short tons. On request, Caterpillar Marine will provide more information on how to conduct a bollard pull trial.

Prior to a vessel completed, however, Caterpillar Marine can calculate the estimated bollard pull.

For more information contact your local Cat dealer today. Together we can work out the perfect solution that is fully customized to you and your needs.

TALK TO US

For more information
please visit:
www.cat.com/marine

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