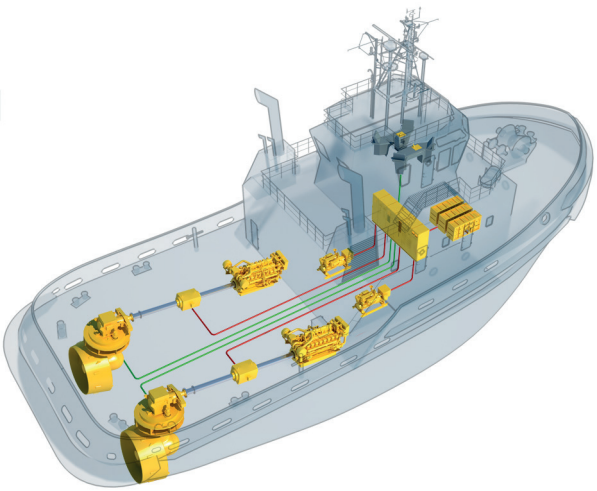
Selection Guide for Harbor and Terminal Tugboats

December 2014



CATERPILLAR®

Standard Diesel Propulsion Packages
Propulsion Packages for ASD/ATD Tugs

High Speed Engines – Cat®

BP *)		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[rpm]		[m]
30	T	2	C32	C	970	1,940	1,800	MTA 318	1.80 m
35	T	2	C32	C	1,081	2,162	2,100	MTA 318	1.80 m
40	T	2	3512	C	1,230	2,460	1,800	MTA 420	2.00 m
45	T	2	3512	C	1,500	3,000	1,600	MTA 420	2.00 m
50	T	2	3512	C	1,500	3,000	1,600	MTA 524	2.40 m
55	T	2	3512	C	1,765	3,530	1,800	MTA 524	2.40 m
60	T	2	3512	D	1,902	3,804	1,800	MTA 524	2.40 m
60	T	2	3516	B	1,920	3,840	1,600	MTA 524	2.40 m
65	T	2	3516	C	2,000	4,000	1,600	MTA 627	2.70 m
70	T	2	3516	B	2,240	4,480	1,800	MTA 627	2.70 m
80	T	2	3516	C	2,350	4,700	1,800	MTA 730	3.00 m
85	T	2	3516	D	2,525	5,050	1,800	MTA 730	3.00 m

Medium Speed Engines – Cat®

BP *)		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[rpm]		[m]
60	T	2	C280-6	CS	1,730	3,460	900	MTA 627	2.70 m
65	T	2	C280-6	MC	1,900	3,800	900	MTA 627	2.70 m
65	T	2	C280-6	MC	2,030	4,060	1,000	MTA 627	2.70 m
80	T	2	C280-8	CS	2,300	4,600	900	MTA 730	3.00 m
85	T	2	C280-8	MC	2,530	5,060	900	MTA 730	3.00 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Standard Diesel Propulsion Packages

Propulsion Packages for ASD/ATD Tugs

Medium Speed Engines – MaK

BP		No. of Propulsions	Engine Type	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
				[kW]	[kW]	[rpm]		[m]
40	T	2	6 M 20 C	1,081	2,162	1,000	MTA 420	2.00 m
50	T	2	8 M 20 C	1,520	3,040	1,000	MTA 524	2.40 m
60	T	2	6 M 25 C	1,740	3,480	720	MTA 627	2.70 m
70	T	2	6 M 25 C	2,100	4,200	750	MTA 728	2.80 m
80	T	2	8 M 25 C	2,320	4,640	720	MTA 730	3.00 m
80	T	2	8 M 25 C	2,400	4,800	750	MTA 730	3.00 m
85	T	2	8 M 25 C	2,666	5,332	750	MTA 730	3.00 m
95	T	2	8 M 25 C	2,800	5,600	750	MTA 832	3.20 m
100	T	2	8 M 25 C	2,800	5,600	750	MTA 834	3.40 m

Medium Speed Engines – EMD

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[rpm]		[m]
40	T	2	8 E 23	CS	1,249	2,498	750	MTA 420	2.00 m
50	T	2	8 E 23	CS	1,491	2,982	900	MTA 524	2.40 m
60	T	2	8 E 23	MC	1,694	3,388	900	MTA 627	2.70 m
65	T	2	8 E 23	MC	1,864	3,728	900	MTA 627	2.70 m
70	T	2	12 E 23	MC	2,047	4,094	750	MTA 728	2.80 m
75	T	2	12 E 23	CS	2,237	4,474	900	MTA 730	3.00 m
80	T	2	12 E 23	MC	2,460	4,920	900	MTA 730	3.00 m
85	T	2	16 E 23	CS	2,629	5,258	800	MTA 730	3.00 m
90	T	2	16 E 23	MC	2,727	5,454	750	MTA 832	3.20 m
95	T	2	16 E 23	MC	2,892	5,784	800	MTA 832	3.20 m
100	T	2	16 E 23	MC	2,892	5.784	800	MTA 834	3.40 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Standard Diesel Propulsion Packages

Propulsion Packages for Rotortugs

High Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[rpm]		[m]
45	T	3	C32	C	970	2,910	1,800	MTA 318	1.80 m
50	T	3	C32	C	1,081	3,243	2,100	MTA 318	1.80 m
50	T	3	3512	C	1,051	3,153	1,600	MTA 318	1.80 m
60	T	3	3512	C	1,230	3,690	1,800	MTA 420	2.00 m
70	T	3	3512	C	1,500	4,500	1,600	2xMTA 420 1xMTA 524	2.00 m 2.40 m
80	T	3	3512	C	1,765	5,295	1,800	MTA 524	2.40 m
85	T	3	3516	C	1,864	5,592	1,800	MTA 524	2.40 m
100	T	3	3516	C	2,000	6,000	1,600	MTA 627	2.70 m

Medium Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[rpm]		[m]
85	T	3	C280-6	CS	1,730	5,190	900	MTA 627	2.70 m
90	T	3	C280-6	CS	1,850	5,550	1,000	MTA 627	2.70 m
95	T	3	C280-6	MC	2,030	6,090	1,000	MTA 627	2.70 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Standard Diesel Propulsion Packages

Propulsion Packages for Rotortugs

Medium Speed Engines – MaK

BP		No. of Propulsions	Engine Type	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
				[kW]	[kW]	[rpm]		[m]
50	T	3	6 M 20 C	1,080	3,240	900	MTA 418	1.80 m
55	T	3	6 M 20 C	1,200	3,600	1,000	MTA 420	2.00 m
75	T	3	8 M 20 C	1,520	4,560	1,000	MTA 524	2.40 m
85	T	3	6 M 25 C	1,740	5,220	720	MTA 627	2.70 m
90	T	3	9 M 20 C	1,800	5,400	1,000	MTA 627	2.70 m
100	T	3	6 M 25 C	2,100	6,300	750	MTA 728	2.80 m

Medium Speed Engines – EMD

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[rpm]		[m]
55	T	3	8 E 23	CS	1,249	3,747	750	MTA 420	2.00 m
75	T	3	8 E 23	CS	1,491	4,473	900	MTA 524	2.40 m
85	T	3	8 E 23	MC	1,694	5,082	900	MTA 627	2.70 m
90	T	3	8 E 23	MC	1,864	5,592	900	MTA 627	2.70 m
100	T	3	12 E 23	MC	2,047	6,141	750	MTA 627	2.70 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Standard Diesel Propulsion Packages

Hybrid Propulsion Packages (Hybrid A)
Hybrid Propulsion Packages for ASD/ATD Tugs

High Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
50	T	2	3512	C	1,500	500	4,000	1,600	MTA 524	2.40 m
60	T	2	3516	B	1,920	500	4,840	1,600	MTA 524	2.40 m
65	T	2	3516	C	2,000	500	5,000	1,600	MTA 627	2.70 m
70	T	2	3516	B	2,240	500	5,480	1,800	MTA 627	2.70 m
80	T	2	3516	C	2,350	500	5,700	1,800	MTA 730	3.00 m
85	T	2	3516	D	2,525	500	6,050	1,800	MTA 730	3.00 m

Medium Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
65	T	2	C280-6	MC	1,900	500	4,800	900	MTA 627	2.70 m
65	T	2	C280-6	MC	2,030	500	5,060	1,000	MTA 627	2.70 m
80	T	2	C280-8	CS	2,300	500	5,600	900	MTA 730	3.00 m
85	T	2	C280-8	MC	2,530	500	6,060	900	MTA 730	3.00 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid A: A system where additional power does not need to be provided electrically to the shaft to achieve maximum bollard pull. The main engines remain the same size as a conventional vessel and the shaft motor generator is used only for low power maneuvering when mains are shut down or to provide electrical power for vessel services when the mains are running.

Hybrid Propulsion Packages (Hybrid A)

Hybrid Propulsion Packages for ASD/ATD Tugs

Medium Speed Engines – MaK

BP		No. of Propulsions	Engine Type	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
				[kW]	[kW]	[kW]	[rpm]		[m]
50	T	2	8 M 20 C	1,520	500	4,040	1,000	MTA 524	2.40 m
70	T	2	6 M 25 C	2,100	500	5,200	750	MTA 728	2.80 m
80	T	2	8 M 25 C	2,320	500	5,640	720	MTA 730	3.00 m
80	T	2	8 M 25 C	2,400	500	5,800	750	MTA 730	3.00 m
85	T	2	8 M 25 C	2,666	500	6,332	750	MTA 730	3.00 m
95	T	2	8 M 25 C	2,800	500	6,600	750	MTA 832	3.20 m
100	T	2	8 M 25 C	2,800	500	6,600	750	MTA 834	3.40 m

Medium Speed Engines – EMD

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
50	T	2	8 E 23	CS	1,491	500	3,982	900	MTA 524	2.40 m
65	T	2	8 E 23	MC	1,864	500	4,728	900	MTA 627	2.70 m
65	T	2	12 E 23	MC	2,047	500	5,094	750	MTA 627	2.70 m
75	T	2	12 E 23	CS	2,237	500	5,474	900	MTA 730	3.00 m
80	T	2	12 E 23	MC	2,461	500	5,922	900	MTA 730	3.00 m
85	T	2	16 E 23	CS	2,479	500	5,958	750	MTA 730	3.00 m
95	T	2	16 E 23	MC	2,892	500	6,784	800	MTA 832	3.20 m
100	T	2	16 E 23	MC	2,892	500	6,784	800	MTA 834	3.40 m

Hybrid A: A system where additional power does not need to be provided electrically to the shaft to achieve maximum bollard pull. The main engines remain the same size as a conventional vessel and the shaft motor generator is used only for low power maneuvering when mains are shut down or to provide electrical power for vessel services when the mains are running.

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid Propulsion Packages (Hybrid A)

Hybrid Propulsion Packages for Rotortugs

High Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
80	T	3	3512	B	1,678	500	6,534	1,800	MTA 524	2.40 m
85	T	3	3516	C	1,765	500	6,795	1,800	MTA 524	2.40 m
100	T	3	3516	C	2,000	500	7,500	1,600	MTA 627	2.70 m

Medium Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
90	T	3	C280-6	CS	1,730	500	6,690	900	MTA 627	2.70 m
100	T	3	C280-6	MC	2,030	500	7,590	1,000	MTA 627	2.70 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid A: A system where additional power does not need to be provided electrically to the shaft to achieve maximum bollard pull. The main engines remain the same size as a conventional vessel and the shaft motor generator is used only for low power maneuvering when mains are shut down or to provide electrical power for vessel services when the mains are running.

Hybrid Propulsion Packages (Hybrid A)

Hybrid Propulsion Packages for Rotortugs

Medium Speed Engines – MaK

BP		No. of Propulsions	Engine Type	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
				[kW]	[kW]	[kW]	[rpm]		[m]
90	T	3	6 M 25 C	1,740	500	6,720	720	MTA 627	2.70 m
105	T	3	6 M 25 C	2,100	500	7,800	750	MTA 730	3.00 m

Medium Speed Engines – EMD

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
75	T	3	8 E 23	CS	1,491	500	5,973	900	MTA 524	2.40 m
85	T	3	8 E 23	MC	1,694	500	6,582	900	MTA 627	2.70 m
100	T	3	12 E 23	MC	2,047	500	7,641	750	MTA 627	2.70 m

Hybrid A: A system where additional power does not need to be provided electrically to the shaft to achieve maximum bollard pull. The main engines remain the same size as a conventional vessel and the shaft motor generator is used only for low power maneuvering when mains are shut down or to provide electrical power for vessel services when the mains are running.

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid Propulsion Packages (Hybrid A)

Hybrid Propulsion Packages (Hybrid B)
Hybrid Propulsion Packages for ASD/ATD Tugs

High Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
50	T	2	C32	C	1,081	500	3,162	2,000	MTA 524	2.40 m
60	T	2	3512	B	1,425	500	3,850	1,600	MTA 524	2.40 m
65	T	2	3512	C	1,500	500	4,000	1,600	MTA 627	2.70 m
70	T	2	3512	C	1,765	500	4,530	1,800	MTA 627	2.70 m
80	T	2	3512	D	1,895	500	4,790	1,800	MTA 730	3.00 m
85	T	2	3516	C	1,995	600	5,190	1,600	MTA 730	3.00 m
85	T	2	3516	C	2,000	600	5,200	1,600	MTA 730	3.00 m
90	T	2	3516	C	1,995	800	5,590	1,600	MTA 730	3.00 m
90	T	2	3516	B	2,240	600	5,680	1,800	MTA 730	3.00 m
95	T	2	3516	B	2,240	600	5,680	1,800	MTA 832	3.20 m
100	T	2	3516	B	2,240	600	5,680	1,800	MTA 834	3.40 m

Medium Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
75	T	2	C280-6	CS	1,730	500	4,460	900	MTA 730	3.00 m
80	T	2	C280-6	CS	1,850	500	4,700	1,000	MTA 730	3.00 m
85	T	2	C280-6	MC	2,030	600	5,260	1,000	MTA 730	3.00 m
95	T	2	C280-8	CS	2,300	600	5,800	900	MTA 832	3.20 m
100	T	2	C280-8	CS	2,300	600	5,800	900	MTA 834	3.40 m

Hybrid B: A system where additional power needs to be provided electrically to the shaft to achieve maximum bollard pull. The main engines can be smaller than in a conventional vessel because the shaft motor generator are able to provide additional power to the shaft line. The shaft motor generator are therefore used for low power maneuvering when mains are shut down, to provide electrical power for vessel services when mains are running, and to "top up" shaft power when achieving maximum bollard pull.

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid Propulsion Packages (Hybrid B)

Hybrid Propulsion Packages for ASD/ATD Tugs

Medium Speed Engines – MaK

BP		No. of Propulsions	Engine Type	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
				[kW]	[kW]	[kW]	[rpm]		[m]
55	T	2	6 M 20 C	1,080	500	3,160	900	MTA 627	2.70 m
65	T	2	8 M 20 C	1,440	500	3,880	900	MTA 627	2.70 m
65	T	2	8 M 20 C	1,520	500	4,040	1,000	MTA 627	2.70 m
75	T	2	6 M 25 C	1,740	500	4,480	720	MTA 730	3.00 m
80	T	2	9 M 20 C	1,800	500	4,600	1,000	MTA 730	3.00 m
85	T	2	6 M 25 C	2,100	500	5,200	750	MTA 730	3.00 m
95	T	2	8 M 25 C	2,320	600	5,840	720	MTA 832	3.20 m
100	T	2	8 M 25 C	2,320	600	5,840	720	MTA 834	3.40 m

Medium Speed Engines – EMD

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
65	T	2	8 E 23	MC	1,443	500	3,886	800	MTA 627	2.70 m
65	T	2	8 E 23	CS	1,491	500	3,982	900	MTA 627	2.70 m
70	T	2	8 E 23	MC	1,694	500	4,388	900	MTA 730	3.00 m
80	T	2	8 E 23	MC	1,864	500	4,728	900	MTA 730	3.00 m
85	T	2	12 E 23	MC	2,047	500	5,094	750	MTA 730	3.00 m
95	T	2	12 E 23	CS	2,237	600	5,674	900	MTA 832	3.20 m
100	T	2	12 E 23	CS	2,237	600	5,674	900	MTA 834	3.40 m

Hybrid B: A system where additional power needs to be provided electrically to the shaft to achieve maximum bollard pull. The main engines can be smaller than in a conventional vessel because the shaft motor generator are able to provide additional power to the shaft line. The shaft motor generator are therefore used for low power maneuvering when mains are shut down, to provide electrical power for vessel services when mains are running, and to "top up" shaft power when achieving maximum bollard pull.

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid Propulsion Packages (Hybrid B)

Hybrid Propulsion Packages for Rotortugs

High Speed Engines – Cat®

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
80	T	3	3512	C	1,051	600	4,953	1,600	MTA 524	2.40 m
85	T	3	3512	C	1,380	500	5,640	1,800	MTA 524	2.40 m
100	T	3	3512	C	1,500	500	6,000	1,600	MTA 627	2.70 m

Medium Speed Engines – MaK

BP		No. of Propulsions	Engine Type	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
				[kW]	[kW]	[kW]	[rpm]		[m]
85	T	3	6 M 20 C	1,080	600	5,040	900	MTA 627	2.70 m
90	T	3	8 M 20 C	1,360	500	5,580	900	MTA 627	2.70 m
95	T	3	8 M 20 C	1,520	500	6,060	1,000	MTA 627	2.70 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid B: A system where additional power needs to be provided electrically to the shaft to achieve maximum bollard pull. The main engines can be smaller than in a conventional vessel because the shaft motor generator are able to provide additional power to the shaft line. The shaft motor generator are therefore used for low power maneuvering when mains are shut down, to provide electrical power for vessel services when mains are running, and to "top up" shaft power when achieving maximum bollard pull.

Hybrid Propulsion Packages (Hybrid B)

Hybrid Propulsion Packages for Rotortugs

Medium Speed Engines – EMD

BP		No. of Propulsions	Engine Type	Engine Rating	Power per Diesel Engine	Power per Hybrid Motor / Generator	Total Tug Power	Max. engine speed	Propulsion type	Prop. diameter
					[kW]	[kW]	[kW]	[rpm]		[m]
90	T	3	8 E 23	MC	1,374	500	5,622	750	MTA 627	2.70 m
95	T	3	8 E 23	CS	1,491	500	5,973	900	MTA 627	2.70 m

*) Bollard Pull is published in Metric Tons. Metric Tons = 1.10231131 Short Tons

Hybrid B: A system where additional power needs to be provided electrically to the shaft to achieve maximum bollard pull. The main engines can be smaller than in a conventional vessel because the shaft motor generator are able to provide additional power to the shaft line. The shaft motor generator are therefore used for low power maneuvering when mains are shut down, to provide electrical power for vessel services when mains are running, and to "top up" shaft power when achieving maximum bollard pull.

Hybrid Propulsion Packages (Hybrid B)

Bollard Pull

Horsepower (hp) or Kilowatts (kW) alone are not sufficient to gauge a tugboat's power. Since many factors play into propulsion system effectiveness, the best measurement of tugboat power is Bollard Pull, the zero-speed pulling capability of a tug, stated in tons.
A standard indication of maximum pulling force a ship can exert on another ship or object, it allows for comparisons between vessels, particularly tugboats. Bollar Pull measures the real-world usefulness of a tugboat, such as in stranding scenarios or holding larger vessels.

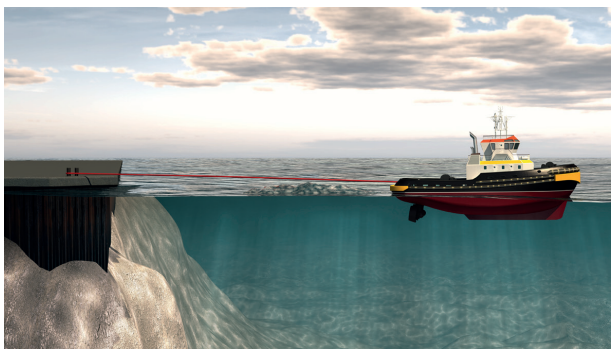
There are three types of Bollard Pull:

- Sustained Bollard Pull – Mean value during a specific period of time or readings.
- Maximum Static Bollard Pull – The highest 30 seconds measured during the test and is always greated than Sustained Bollard Pull.
- Maximum Bollard Pull – The single measured value, and is substantially higher than Sustained Bollard Pull and should not be referred to only as "Bollard Pull".

Bollard Pull can be measured in three ways:

- Practical trial
- Calculation / Simulation
- Conversion of hp or kW into BP using rules of thumb

Ideally, Bollard Pull is verified when a tug is built then certified by one of the marine classification societies. This is done by tying a towing line from an on-shore bollard to a measuring instrument, then again from the measuring instrument to the tugboat.
Prior to a vessel completed, however, Caterpillar Marine can calculate the estimated Bollard Pull.



Bollard Pull

Subject to change without notice.

Leaflet No. 107 · 12.14 · e · L+S · VM3

LEDM0068-01

CATERPILLAR®