

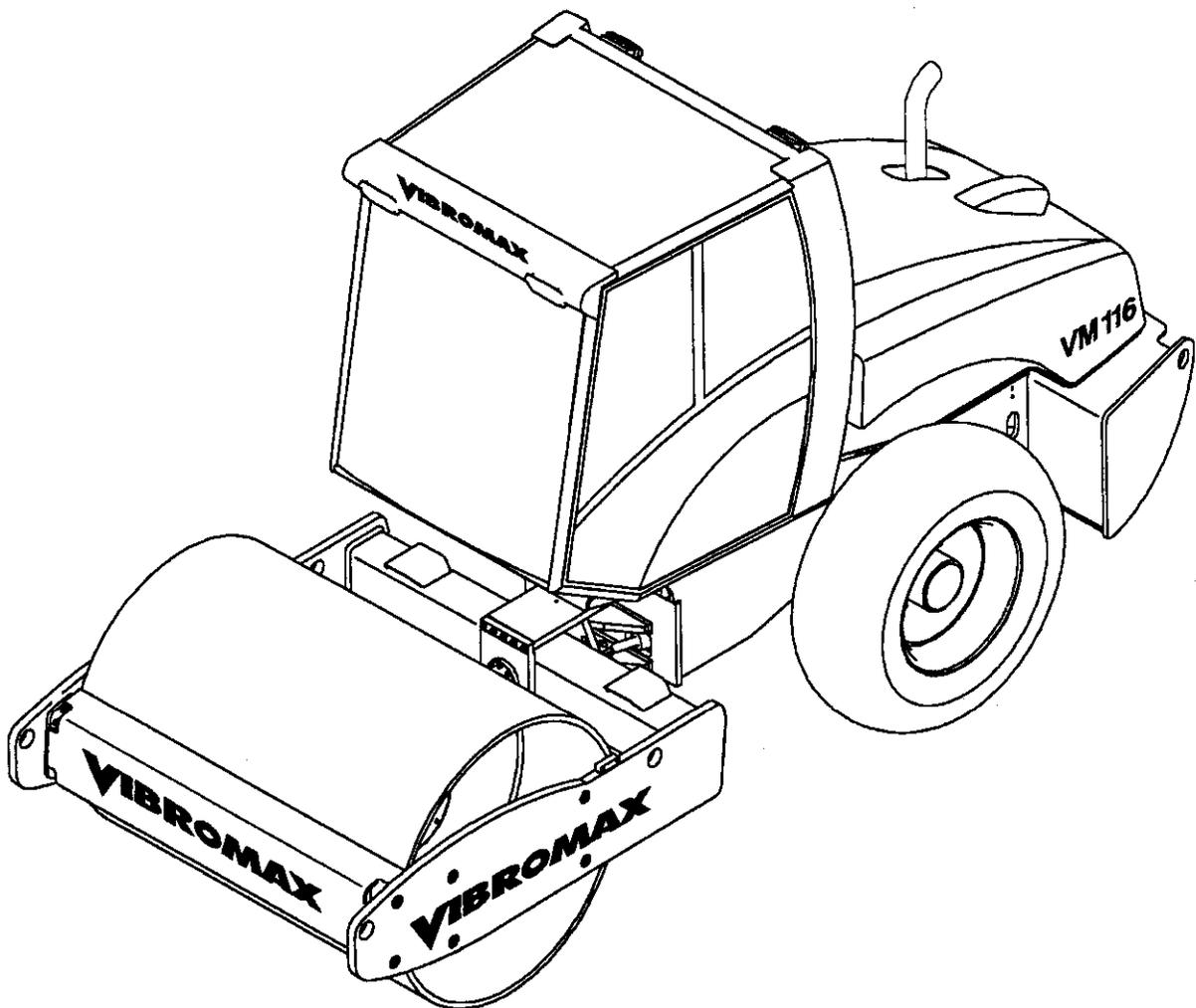
# VIBROMAX

## SINGLE DRUM ROLLER

*SERVICE MANUAL SM96116*

May 2004

**Models VM 116 - 146 - 166 - 186**



Product: Vibromax VM 116,146,166,186 Sigle Drum Roller?Service Repair Workshop Manual SM96116

Full Download: <https://www.arepairmanual.com/downloads/vibromax-vm-116146166186-sigle-drum-roller-service-repair-workshop-manual-sm96116>

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## **CALIFORNIA**

### **Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Sample of manual. Download All 194 pages at:

<https://www.arepairmanual.com/downloads/vibromax-vm-116146166186-sigle-drum-roller-service-repair-workshop-manual-sm96116>

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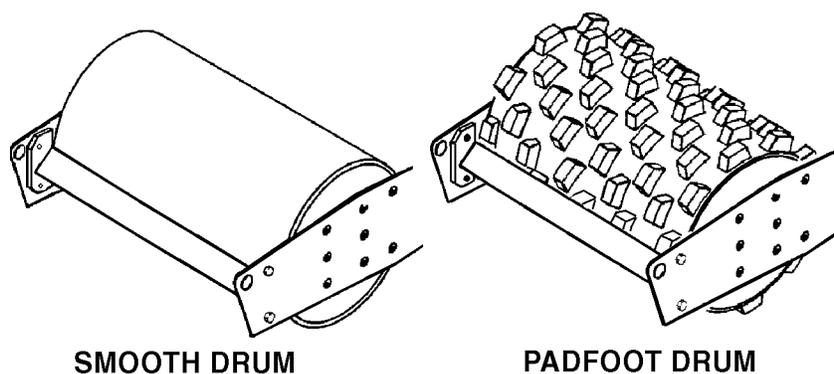
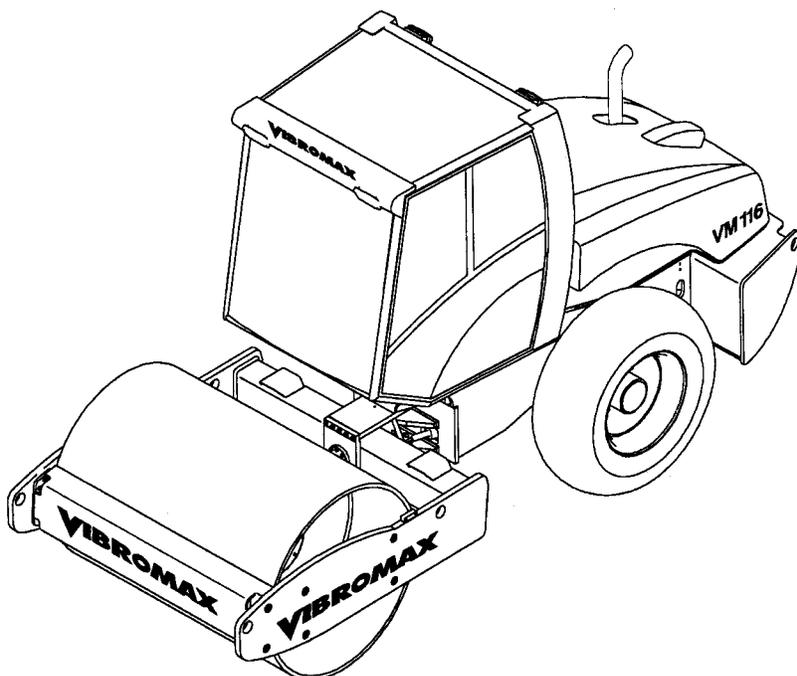
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# SECTION ONE

## GENERAL INFORMATION



## MACHINE DESCRIPTION



SMOOTH DRUM

PADFOOT DRUM

This book introduces the new Vibromax 6 series single drum rollers. Included within the pages of the book are materials covering the Models VM116, VM146, VM166, and VM186.

The new rollers all use the Cummins 5.9 liter 6 cylinder engine. The engines are turbocharged with charge air cooling. All of the new engines are tuned to meet the latest EPA emissions standards.

A Sauer Sundstrand Series 90 variable displacement, axial piston hydrostatic pump, used for machine propulsion, is mounted to the flywheel end of the engine. It provides oil to a 2 speed drum drive motor and a 2 speed axle drive motor in a parallel path. The drum motor is mounted on the left side of the drum and drives through a planetary gearbox and is isolated from the drum by rubber buffers. The axle drive motor is attached directly to the rear axle which is a no-spin design.

The vibration system uses a Sauer Sundstrand Series 90 hydrostatic pump similar to the propulsion pump and mounted directly behind the propulsion pump. The vibratory pump supplies oil to a Series 90 hydrostatic motor mounted at the right side of the drum. The new models operate at frequencies of 1740 or 2160 vibrations per minute on both the smooth drum and pad foot versions.

A steering pump, mounted to the rear of the vibration pump, provides the oil needed for steering. The steering pump is also a second charge pump in the propulsion/vibration circuit. The steering pump draws oil from the reservoir, passes it through the steering control valve, through the inline hydraulic filter, and into the charge circuit. The charge pump draws oil from the reservoir, joins the steering oil at the filter, passes it through the filter and into the charge circuit.

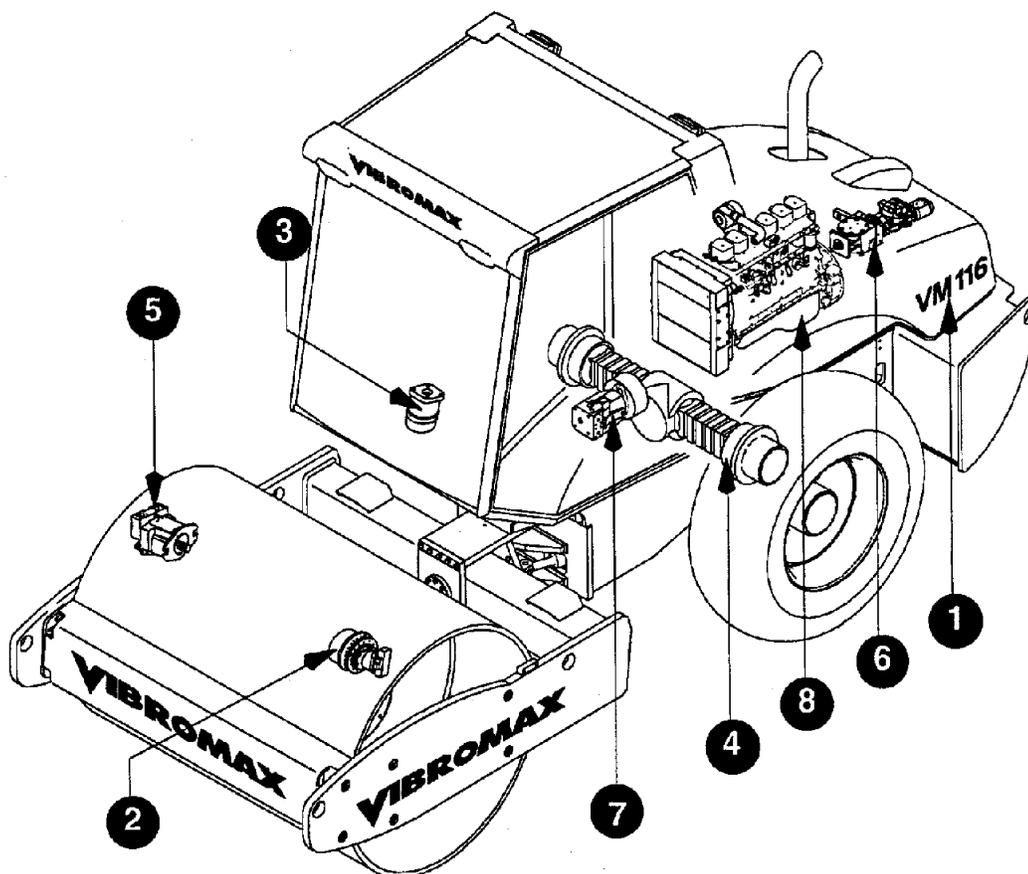
These machines come standard with parking brakes at both the front drum and the rear axle. A spring applied-hydraulically released multi disc brake is part of the drum drive motor gearbox. The axle uses a spring applied hydraulically released multiple disc brake at each axle shaft.

Pressure testing has been made easier by placing all the test ports at a centrally located test station under the engine hood on the right side of the machine.

The electrical system consists of a 12 volt battery, starter, alternator system, optional lighting and standard instrumentation and back-up alarm.

The machines come standard with ROPS and seat belt. An optional ROPS cab is available.

Check with your Vibromax dealer for other available options.



**SERIAL NUMBERS**

1	Model / Serial Number	
2	Front Drum Drive Motor S/N	
3	Steering Unit S/N	
4	Axle S/N	
5	Vibratory Motor S/N	
6	Hydraulic Pumps S/N	
7	Axle Drive Motor S/N	
8	Engine S/N	

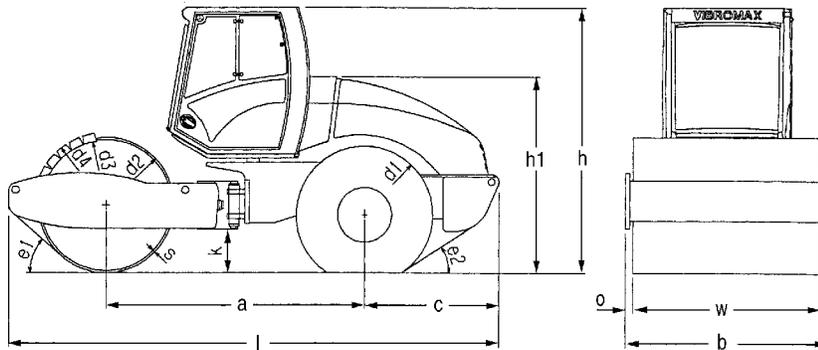


## FLUID SPECIFICATIONS

MACHINE PART	CAPACITY USA (metric)	SPECIFICATIONS
Fuel tank	105 gal (397 ltr)	see diesel fuel
Engine crankcase VM116, VM146 VM166, VM186	15 qts(14.5 ltr)	engine oil API classification API CI-4 multigrade engine oil (see oil chart)
Hydraulic system  Reservoir only	21.1 gal (80 ltr)  14.5 gal (55 ltr)	cold weather HLP 46 DIN 51524/2 hot weather HLP 68 DIN 51524/2 Mobil DTE 25,26 Shell Tellus OL 46,68 Amoco Rykon HD 46,68 Texaco Rando HD 46,68
Vibration system	12.7 qts. (12 ltr)	CLP 150 DIN 51517/3 Mobil Gear 629 Shell Omala 150 Texaco Meropa 150
Battery	as required	Distilled water
Grease	as required	KP3K DIN 51502 Mobil Oil - Mobilux 3 Shell Oil - Alvania 3 Texaco Oil - Starplex 3
Engine coolant	20 qts (19 ltr)	50% ethylene glycol and 50% water
Tire ballast	see chart	Calcium Chloride (77%CaCl <sup>2</sup> )
ZF Axle gear	15.8 qts. (15 ltr)	SAE 90 API GL-5 gear lubricant alternate SAE85/140 API GL-5 gear lubricant
Drum gearbox VM116 VM146 & VM166  VM186	1.4 qts (1.3 l)  3.8 qts (3.6 l)	CLP 220 LS 2 DIN 51517/3 Mobilgear 630 Mobilgear SHC 220 Texaco Syngear 220

MACHINE SPECIFICATIONS

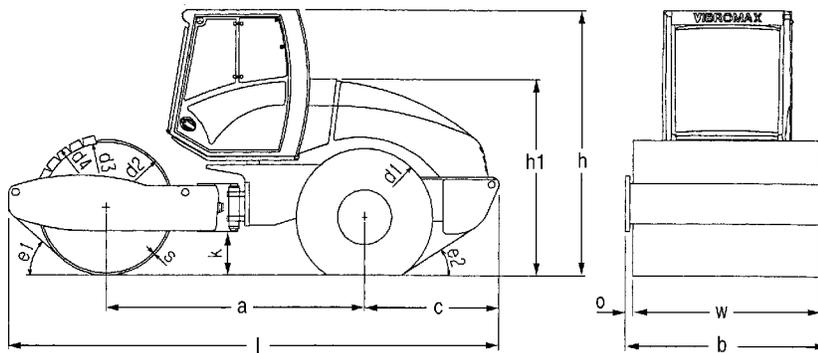
MODEL VM116



	in.	mm
a	118.0	2996
b	89.4	2270
c	65.0	1651
d1	59.8	1520
d2	59.1	1500
d3	55.1	1400
d4	63.0	1600
h	115.6	2935
h1	85.0	2160
k	17.6	447
l	225.3	5722
o	3.3	85
s	1.0	25
w	82.7	2100
e1	41 degrees	
e2	29 degrees	

ENGINE Make/Model/Type/Displacement - cu. in. (cc) HP, SAE net (kW) @2200 rpm Air Cleaner / Fuel filter Fuel capacity - gal (ltr)	Cummins 5.9 150C, 6 cylinder turbo diesel (water cooled), 359 cu.in. (5880cc) with charge air cooler 150 (112) Dual replaceable elements, Spin-on cartridge 105.7 (400)			
	VM116D		VM116PD	
Operating weight max. -lb (kg)	28860 (13000)		29542 (13400)	
Weight, front-lb (kg)	16094 (7300)		16976 (7700)	
Weight, rear axle - lb (kg)	12566 (5700)		12566 (5700)	
Static applied linear drum load lb/in (kg/cm)	195 (34.8)		-----	
Articulation/oscillation-degrees	35/15		35/15	
Turning radius-inside-in. (m)	142 (3.6)		142 (3.6)	
Drum shell thickness-in. (mm)	1.0 (25)		1.0 (25)	
Number of pad feet/height of foot - in. (mm)			132/ 3.9 (100)	
Contact area of foot-sq. in. (cm)			64 sq.in.(413 sq. cm)	
Tire size	23.1 - 26 8PR diamond tread		23.1 - 26 8PR tractor tread	
Travel speed - 1st range mph (km/hr)	0 - 4.8 (0 - 7.7)		0 - 4.8 (0 - 7.7)	
- 2nd range mph (km/hr)	0 - 7.9 (0 - 12.7)		0 - 7.9 (0 - 12.7)	
Theoretical gradeability up to - %	60		65	
Brakes - front drum	disc		disc	
- rear axle	disc - input shaft		disc - input shaft	
	1st Stage	2nd Stage	1st Stage	2nd Stage
Max compaction depth up to - in. (cm)	39 (100)	31 (80)	39 (100)	31 (80)
Frequency - vpm (Hz)	1740 (29)	2160 (36)	1740 (29)	2160 (36)
Amplitude - in. (mm)	.079 (2.0)	.031 (0.8)	.079 (2.0)	.031 (0.8)
Centrifugal force - lbf (kN)	63396 (282)	39117 (174)	68567 (305)	42264 (188)
Centrifugal force/drum width - lb/in. (N/cm)	767 (1343)	473 (829)	829 (1452)	511 (895)

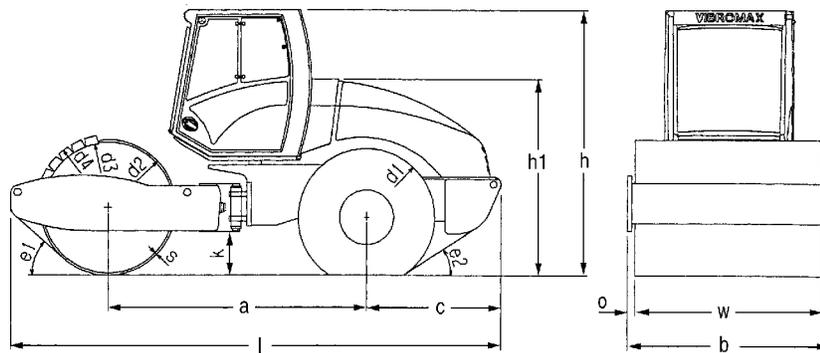
MODEL VM146



	in.	mm
a	118.0	2996
b	89.4	2270
c	65.0	1651
d1	59.8	1520
d2	59.1	1500
d3	55.1	1400
d4	63.0	1600
h	115.6	2935
h1	85.0	2160
k	17.6	447
l	225.3	5722
o	3.3	85
s	1.4	35
w	82.7	2100
e1	41 degrees	
e2	29 degrees	

ENGINE Make/Model/Type/Displacement - cu. in. (cc) HP, SAE net (kW) @2200 rpm Air Cleaner / Fuel filter Fuel capacity - gal (ltr)	Cummins 5.9 173C, 6 cylinder turbo diesel (water cooled), 359 cu.in. (5880cc) with charge air cooler 173 (129) Dual replaceable elements, Spin-on cartridge 105.7 (400)			
	VM146D		VM146PD	
Operating weight max. -lb (kg)	31306 (14200)		32187 (14600)	
Weight, front-lb (kg)	15873 (7200)		16775 (7600)	
Weight, rear axle - lb (kg)	15432 (7000)		15432 (7000)	
Static applied linear drum load lb/in (kg/cm)	192 (34.3)		-----	
Articulation/oscillation-degrees	35/15		35/15	
Turning radius-inside-in. (m)	142 (3.6)		142 (3.6)	
Drum shell thickness-in. (mm)	1.4 (35)		1.4 (35)	
Number of pad feet/height of foot - in. (mm)			132/ 3.9 (100)	
Contact area of foot-sq. in. (cm)			64 sq.in.(413 sq. cm)	
Tire size	23.1 - 26 8PR diamond tread		23.1 - 26 8PR tractor tread	
Travel speed - 1st range mph (km/hr)	0 - 4.5 (0 - 7.3)		0 - 4.5 (0 - 7.3)	
- 2nd range mph (km/hr)	0 - 7.1 (0 - 11.4)		0 - 7.1 (0 - 11.4)	
Theoretical gradeability up to - %	62		65	
Brakes - front drum	disc		disc	
- rear axle	disc - input shaft		disc - input shaft	
	1st Stage	2nd Stage	1st Stage	2nd Stage
Max compaction depth up to - in. (cm)	47 (120)	39 (100)	47 (120)	39 (100)
Frequency - vpm (Hz)	1740 (29)	2100 (35)	1740 (29)	2100 (35)
Amplitude - in. (mm)	.071 (1.8)	.031 (0.8)	.071 (1.8)	.031 (0.8)
Centrifugal force - lbf (kN)	66768 (297)	43163 (192)	66768 (297)	43163 (192)
Centrifugal force/drum width - lb/in. (N/cm)	808 (1414)	522 (914)	808 (1414)	522 (914)

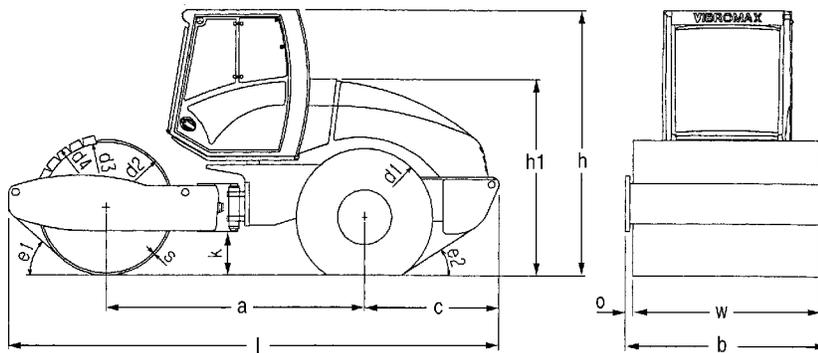
MODEL VM166



	in.	mm
a	118.0	2996
b	89.4	2270
c	65.0	1651
d1	59.8	1520
d2	59.1	1500
d3	55.1	1400
d4	63.0	1600
h	115.6	2935
h1	85.0	2160
k	17.6	447
l	230.2	5847
o	3.3	85
s	1.4	35
w	82.7	2100
e1	36 degrees	
e2	29 degrees	

ENGINE Make/Model/Type/Displacement - cu. in. (cc) HP, SAE net (kW) @2200 rpm Air Cleaner / Fuel filter Fuel capacity - gal (ltr)	Cummins 5.9 173C, 6 cylinder turbo diesel (water cooled), 359 cu.in. (5880cc) with charge air cooler 173 (129) Dual replaceable elements, Spin-on cartridge 105.7 (400)			
	VM166D		VM166PD	
Operating weight max. -lb (kg)	36156 (16400)		37038 (16800)	
Weight, front-lb (kg)	19842 (9000)		20723 (9400)	
Weight, rear axle - lb (kg)	16314 (7400)		16314 (7400)	
Static applied linear drum load lb/in (kg/cm)	240 (42.9)		-----	
Articulation/oscillation-degrees	35/15		35/15	
Turning radius-inside-in. (m)	142 (3.6)		142 (3.6)	
Drum shell thickness-in. (mm)	1.4 (35)		1.4 (35)	
Number of pad feet/height of foot - in. (mm)			132/ 3.9 (100)	
Contact area of foot-sq. in. (cm)			64 sq.in.(413 sq. cm)	
Tire size	23.1 - 26 8PR diamond tread		23.1 - 26 8PR tractor tread	
Travel speed - 1st range mph (km/hr)	0 - 4.5 (0 - 7.3)		0 - 4.5 (0 - 7.3)	
- 2nd range mph (km/hr)	0 - 7.1 (0 - 11.4)		0 - 7.1 (0 - 11.4)	
Theoretical gradeability up to - %	62		65	
Brakes - front drum	disc		disc	
- rear axle	disc - input shaft		disc - input shaft	
	1st Stage	2nd Stage	1st Stage	2nd Stage
Max compaction depth up to - in. (cm)	51 (130)	39 (100)	51 (130)	39 (100)
Frequency - vpm (Hz)	1740 (29)	2100 (35)	1740 (29)	2100 (35)
Amplitude - in. (mm)	.071 (1.8)	.031 (0.8)	.071 (1.8)	.031 (0.8)
Centrifugal force - lbf (kN)	67668 (301)	43838 (195)	72164 (321)	46760 (208)
Centrifugal force/drum width - lb/in. (N/cm)	818 (1433)	530 (929)	873 (1529)	556 (990)

MODEL VM186



	in.	mm
a	121.1	3076
b	89.4	2270
c	65.4	1660
d1	59.8	1520
d2	63.0	1600
d3	55.1	1400
d4	63.0	1600
h	117.5	2985
h1	88.4	2245
k	19.6	497
l	236.1	5996
o	3.3	85
s	1.6	40
w	82.7	2100
e1	35 degrees	
e2	29 degrees	

ENGINE Make/Model/Type/Displacement - cu. in. (cc) HP, SAE net (kW) @2200 rpm Air Cleaner / Fuel filter Fuel capacity - gal (ltr)	Cummins 5.9 173C, 6 cylinder turbo diesel (water cooled), 359 cu.in. (5880cc) with charge air cooler 173 (129) Dual replaceable elements, Spin-on cartridge 84.5 (320)			
	VM186D		VM186PD	
Operating weight max. -lb (kg)	43431 (19700)		43431 (19700)	
Weight, front-lb (kg)	26015 (11800)		26015 (11800)	
Weight, rear axle - lb (kg)	17416 (7900)		17416 (7900)	
Static applied linear drum load lb/in (kg/cm)	315 (56.2)		-----	
Articulation/oscillation-degrees	35/15		35/15	
Turning radius-inside-in. (m)	142 (3.6)		142 (3.6)	
Drum shell thickness-in. (mm)	1.6 (40)		1.6 (40)	
Number of pad feet/height of foot - in. (mm)			132/ 3.9 (100)	
Contact area of foot-sq. in. (cm)			64 sq.in.(413 sq. cm)	
Tire size	23.1 - 26 8PR diamond tread		23.1 - 26 8PR tractor tread	
Travel speed - 1st range mph (km/hr)	0 - 4.7 (0 - 7.6)		0 - 4.7 (0 - 7.6)	
- 2nd range mph (km/hr)	0 - 7.3 (0 - 11.8)		0 - 7.3 (0 - 11.8)	
Theoretical gradeability up to - %	45		45	
Brakes - front drum	disc		disc	
- rear axle	disc - input shaft		disc - input shaft	
	1st Stage	2nd Stage	1st Stage	2nd Stage
Max compaction depth up to - in. (cm)	57 (145)	39 (100)	57 (145)	39 (100)
Frequency - vpm (Hz)	1740 (29)	2100 (35)	1740 (29)	2100 (35)
Amplitude - in. (mm)	.079 (2.0)	.030 (0.75)	.079 (2.0)	.030 (0.75)
Centrifugal force - lbf (kN)	83179 (370)	46086 (205)	83179 (370)	46086 (205)
Centrifugal force/drum width - lb/in. (N/cm)	1006 (1762)	557 (976)	1006 (1762)	557 (976)

**STANDARD TORQUE DATA**

Where no special torque data is specified, the following torque figures should be applied.

Threads should be lubricated with engine oil or grease.

**STANDARD TORQUE SPECIFICATIONS +/- 10%**

SIZE	GRADE 8.8		GRADE 10.9		GRADE 12.9	
	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
5mm	4	5.5	5.5	7.5	6.6	9
6mm	6.6	9	9.2	12.5	11	15
8mm	16.5	22.5	23	31.5	26.5	36
10mm	32	44	45	62	55	75
12mm	57	77.5	81	110	95	130
14mm	88	120	125	170	155	210
16mm	140	190	195	265	236	320
18mm	192	260	269	365	320	435
20mm	273	370	383	520	457	620
22mm	369	500	516	700	619	840
24mm	471	640	665	900	796	1080
27mm	702	950	996	1350	1195	1620
30mm	955	1300	1328	1800	1593	2160

**NUTS FOR TUBES AND HOSES**

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
16MM X 1.5	20	14.5
18MM X 1.5	35	26
20MMX1.45	45	33.2
24MM X 1.5	60	44

**FITTINGS, CONNECTIONS AND PLUGS**

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
10MM X 1	20	14.5
12MM X 1.5	35	26
14MM X 1.5	45	33.2

**FITTINGS, CONNECTIONS AND PLUGS**

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
16MM X 1.5	60	44
18MM X 1.5	70	51
22MM X 1.5	100	73
27MM X 2	200	147
33MM X 2	280	207
42MM X 2	380	281

**FLANGES**

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
8MM X 1.5	28	21
10MM X 1.5	55	41
12MM X 1.75	90	67
14MM X 2	145	107
16MM X 2	230	170

**DIESEL FUEL SPECIFICATION**

If fuel is stored for a long time, foreign particles or water can collect in the fuel storage tank. Many engine problems are caused by contaminated fuel. Store fuel outside and keep the fuel as cool as possible. Drain water from the fuel storage tank at regular intervals.

**NOTE:** Paraffin crystals will start to form in fuel when the fuel temperature falls below the fuel's cloud point. These paraffin crystals will clog the fuel filter and cause the engine to stop or lose power. At ambient temperatures above 32°F (0°C) use #2 diesel fuel. At temperature below 32°F (0°C) use #1 diesel fuel blend.

Different brands of fuel can exhibit different properties. Make sure that the number 2 diesel fuel you use meets the following minimum requirements.

**MINIMUM REQUIREMENTS FOR NO.2 DIESEL FUEL:**

Maximum cloud point	-10°F (-23°C)
Maximum pour point	42°F (6°C) below the lowest ambient air temperature at which the engine must start
Cetane number, min	40 (45 to 55 in winter or at high altitude)
Max. sulphur content, by weight	0.50%
Max. water content & sediment by volume	0.05%
Max, ash content, by weight	0.01%
Max. carbon residue (10% point)	0.20%
Distillation temperature @ 90% point	540 to 625°F (282-329°C)
Distillation temperature @ end point	675°F (357°C)
Minimum flash point	125°F (52°C)
Viscosity at 100°F (38°C)	
Centistokes	2.0 to 4.3
Saybolt Universal Seconds (SUS)	32 to 40
Copper strip test, 3 hours @ 212°F (100°C)	No 3 ASTM
Minimum API gravity	30

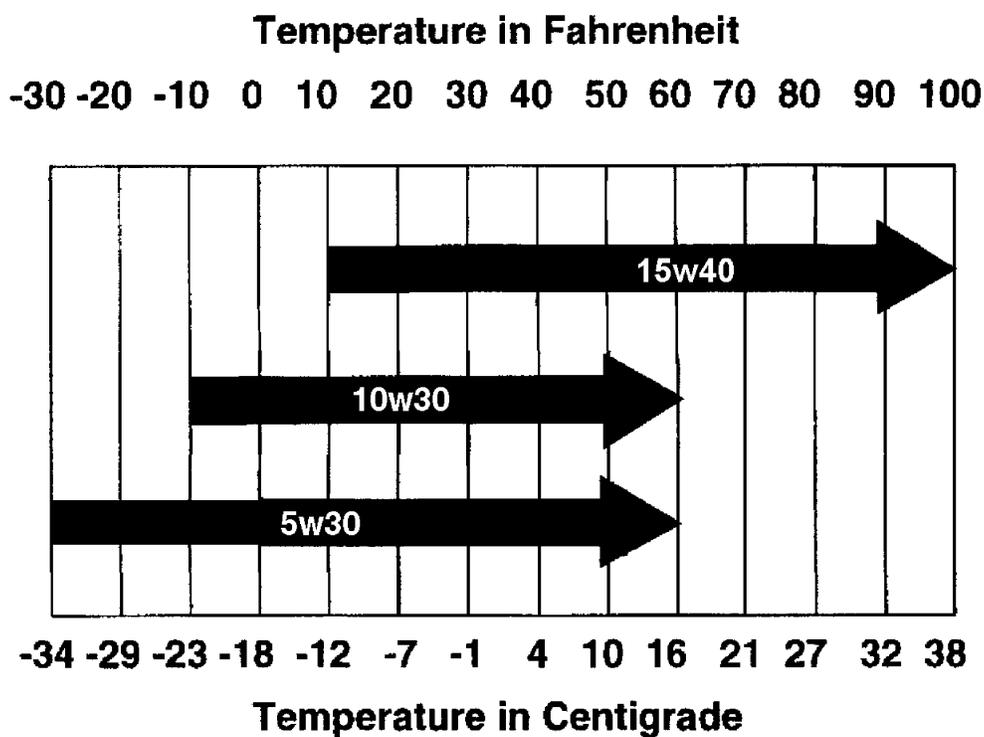
**ENGINE OIL SPECIFICATION**

Use multigrade engine oil with API engine oil service classification CI-4.

**NOTE:** DO NOT use performance additives or other oil additives in your engine crankcase.

See the chart below for recommended oil viscosity at the various ambient air temperature range

**Engine Oil Viscosity Chart**  
**Ambient Air Temperature Ranges**



## SAFETY, GENERAL

The information in this manual does not replace any safety rules and laws used in your area. Before operating this machine, learn the rules and laws for your area and make sure your machine has the correct equipment according to these rules and regulations. Before starting the engine study the operator's manual.

- Know the location and function of all machine controls.
- Clear the area of other persons before you start the engine.
- Check all controls in a safe area before you operate the machine.
- Understand the limits of the machine.
- Do not try to do too much too fast.
- Keep the machine under control at all times.

The following decal is located on the left side of the machine on the fuse box door. Check the decal daily. Clean or replace as needed.



## SPARK ARRESTER

**NOTE:** Rules or laws in some areas may require that this machine be equipped with a spark arrester or spark arrester muffler. Check the rules or laws in your area.

## PERSONAL



*Loose clothing and jewelry can cause an accident. Do not wear loose clothing or jewelry that can catch on controls, etc. Do wear safety shoes, hard hat, heavy gloves, etc. when required for your protection.*

*Foreign materials and loose objects on the steps, hand rails, and in the operator's compartment can cause accidents and injury. Keep the steps, hand rails, and operator's compartment clear at all times.*

*Make sure cab windows are clean and unobstructed.*

*Know and understand the arrangements for movement of trucks, machines, and persons on your job site. Understand and follow the instructions of flagmen, road signs, or signals.*



*Check machine controls for proper operation prior to starting the machine.*

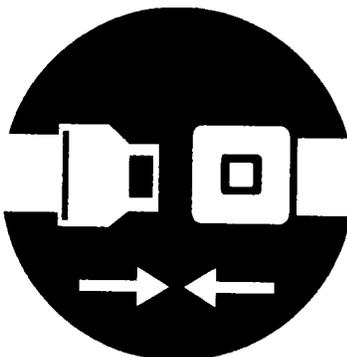
*A fire can cause injury or death. Always have a fire extinguisher on the job site near the machine. Make sure the fire extinguisher is serviced according to the manufacturer's instructions.*

*Holes, obstructions, debris, and other work area hazards can cause injury or death. Always walk-around and look for these and other hazards before you operate your machine in a new work area.*

*Lack of, or incomplete, machine inspection and maintenance can cause accidents. Always follow the instructions in this manual for machine inspection and maintenance.*

*Always use the seat belt when operating the machine. Make sure the buckle is fully secured.*

The following decal is located on the instrument panel. Check the decal daily. Clean or replace as needed.



***Always wear the proper ear protection when operating this machine. Permanent hearing loss can result from extended exposure to loud noises.***

The following decal is located on the instrument panel on machines without cabs. Check the decal daily. Clean or replace as needed.



## MACHINE OPERATION



***Dust, smoke, fog, etc. can decrease your vision and cause an accident. Always stop or slow the machine until you can clearly see your work area and the surrounding traffic.***



***Operate the controls from the operator's seat only, and keep your hands on the controls during operation.***

The following decal is located on the right side of the operator seat box. Check the decal daily. Clean or replace as needed.



***Do not permit other people to ride on the machine as passengers.***

***Sparks from the electrical system or engine exhaust can cause a fire or explosion. Before you operate this machine in an area with flammable dust or vapors, use good ventilation to remove the flammable dust or vapors.***

***Engine exhaust fumes can cause injury or death. If you operate this machine in an enclosed area, use good ventilation to replace the exhaust fumes with fresh air.***

***The vibrations from this machine can cause the walls of a trench or high bank to collapse. Make sure the walls of the trench or bank are braced. If you do not follow these instructions, you can cause personal injury or death to persons working in these areas.***

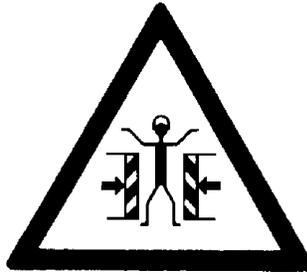
***This machine uses an articulating joint. Keep all persons clear of this pinch area when the engine is running. Machine movement can cause personal injury.***

The following decal is located on each side of the machine's front frame in the articulation joint area. Check the decals daily. Clean or replace as needed.



6186-sigle-drum-roller-service-repair-workshop-manual-sm9611

6) The following decal is also located on both sides of the rear frame in the area of the articulation joint and symbolizes the danger of the pinch point. Check the decals daily. Clean or replace as needed.



***A machine out of control can cause injury or death. You must make a judgement if weather and earth conditions will permit safe operation on a hill, ramp, or rough ground. Adjust machine operation accordingly.***

***Operating this machine too close to High Voltage electrical lines can cause injury or death. Follow the guide lines listed below.***

***NOTE: IF THE CLEARANCES IN THE SPECIFICATIONS BELOW ARE LESS THAN THE CLEARANCES GIVEN IN THE RULES AND LAWS OF YOUR AREA, YOU MUST FOLLOW THE RULES AND LAWS OF YOUR AREA!***

**Table 1: Electrical Safety Rules**

Cable Voltage	Minimum Clearance From Cable When Machine is Working	Minimum Clearance From Cable When Transporting Machine
50,000 volts or less	10 feet (3 meters)	4 feet (1.2 meters)
50,000 volts to 345,000 volts	10 feet (3m) plus 1/2 inch (13mm) for every 1000 volts over 50,000 volts	10 feet (3 meters)
345,000 volts to 750,000 volts	10 feet (3m) plus 1/2 inch (13mm) for every 1000 volts over 50,000 volts	16 feet (5 meters)