

Item #356

Volvo DD120C Asphalt Compactor

**Vendor Contact Information:**

Kevin Gray  
Governmental Sales Manager  
Alta Construction Equipment  
Florida  
8418 Palm River Road  
Tampa, FL 33619  
Office: 813-630-0077  
Cell: 813-391-8159  
Email: [kgray@altaequipfl.com](mailto:kgray@altaequipfl.com)

## Model: Volvo DD120C Asphalt Compactor

Description	Article
Volvo DD120C Asphalt Compactor	DD120C
HF: 2 Amplitude	DD16002
Std Wipers Inside and Out	DD13003
Winter. Drum Spray Water Pump	DD17002
NA Engine	DD39201
Standard Hood Selection	DD39301
Premium Seat	DD42007
Standard ROPS/FOPS	DD48003
Back up alarm	DD51001
Infrared Temperature Sensor	DD53002
Strobe	DD59804
Halogen, 4 Lights	DD59902
English Manual	DD74025
North American Decals	DD89128
Lifetime Frame	DD89801

Volvo Construction Equipment  
Building Tomorrow



# DD110C, DD120C, DD140C

Volvo Double Drum Compactors 11.0-13.8 t / 24,300-30,500 lb 148 hp





# A passion for performance

At Volvo Construction Equipment, we're not just coming along for the ride. Developing products and services that raise productivity – we are confident we can lower costs and increase profits for customers around the globe. Part of the Volvo Group, we are passionate about innovative solutions to help you work smarter – not harder.

## Helping you to do more

Doing more with less is a trademark of Volvo Construction Equipment. High productivity has long been married to low energy consumption, ease of use and durability. When it comes to lowering life-cycle costs, Volvo is in a class of its own.

## Designed to fit your needs

There is a lot riding on creating solutions that are suited to the particular needs of different industry applications. Innovation often involves high technology – but it doesn't always have to. Some of our best ideas have been simple, based on a clear and deep understanding of our customers' working lives.



## You learn a lot in 180 years

Over the years, Volvo has advanced solutions that have revolutionized the use of construction equipment. No other name speaks Safety louder than Volvo. Protecting operators, those around them and minimizing our environmental impact are traditional values that continue to shape our product design philosophy.

## We're on your side

We back the Volvo brand with the best people. Volvo is truly a global enterprise, one that is on standby to support customers quickly and efficiently – wherever they are.

## We have a passion for performance.

## A strong, dedicated, capable dealer network

Our dealers are strategically located throughout North America to provide the equipment you need and the parts and service support you demand for a productive and profitable operation.

The strength of our dealer network is enhanced with extensive individualized product support training at our best-in-class Customer Center in Shippensburg and through hands-on training. Using a great Product Demonstration Center featuring a dedicated area for most common applications, visitors operate equipment from our entire product line under a variety of simulated working conditions. This facility is in year-round use by our dealers and customers.

## Building the best starts right here.

The products designed and manufactured by Volvo Construction Equipment have their beginnings at the most advanced Research & Design centers in the industry. Volvo CE machines are designed in 11 R&D centers and produced in 15 manufacturing facilities across the world.

The major R&D center and manufacturing plant in the Americas is located in Shippensburg, Pennsylvania. This facility has been in operation for over 30 years and – with its recently added 200,000 sq. ft. expansion – now covers 570,000 sq. ft. on an 80 acre campus. Dedicated work teams and highly advanced technologies and techniques using the Volvo Production System ensure continuous quality improvements, labor savings and cost control to reach the high quality that our customers have come to expect from Volvo.







Volvo Trucks



Renault Trucks



Mack Trucks



UD Trucks



Volvo Buses



Volvo Construction Equipment



Volvo Penta



Volvo Financial Services





# BIG PROJECTS, BIG PERFORMANCE

Big projects demand a big performance and the DD110C, DD120C and DD140C drum vibration system delivers the power and efficiency required to achieve optimum compaction results. Rely on the advanced drum control systems to deliver a smooth, high quality finish.



# Perfecting performance

Our next generation of compactors provide you with a smooth, high quality finish for ultimate performance while optimizing fuel efficiency. With the superior drum vibration system and high centrifugal force, the C-Series asphalt compactors achieve more work in fewer passes. Unobstructed visibility, operator comfort and auto-reversing eccentrics enhance productivity, making the compactors ideal for large-scale projects.

## More work, fewer passes

Achieve target density with the Volvo C-Series compactors, which combine high centrifugal force and 8-amplitude option\*, so you can do more work in fewer passes. Ensure high quality compaction thanks to the advanced Volvo drum vibration system, designed to diminish start up power consumption for optimum performance. Enhance pavement rideability with auto-reversing eccentric rotation. \*standard for DD110C



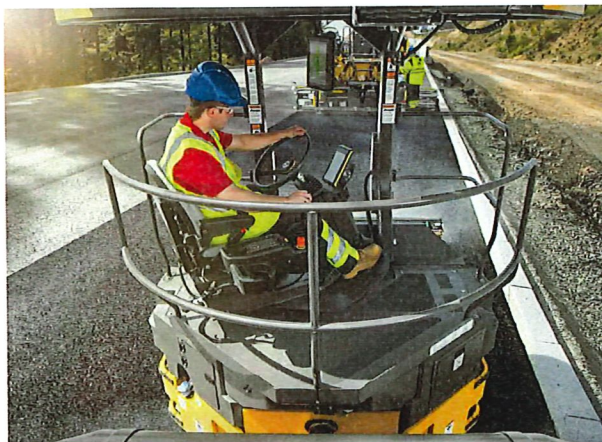
## Unobstructed visibility

Maximize safety with the C-Series compactors from Volvo, boasting impressive all-around visibility of the work zone and surroundings. The 180° rotating console and adjustable seat offer a commanding view of the jobsite, as well as unobstructed sightlines of the drum edges for rolling precision combined with full width drum surface monitoring.



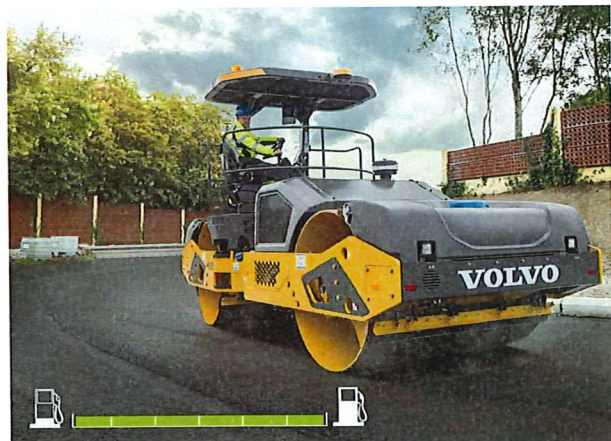
## Comfortably productive

Take on challenging conditions from the comfort and safety of the ROPS/FOPS platform, packed with productivity-enhancing features to keep the operator fresh, alert and focused. The operator environment offers noise and vibration isolation as well as ample storage and legroom, while easy-to-reach controls optimize productivity.



## Drive your costs down

Keep operating costs low with the premium Volvo Tier 4 Final engine, delivering high torque at low rpm for superior performance and high fuel efficiency. The adaptive engine control system delivers optimum power for the task at hand. Reduce fuel consumption further with optional auto-idling and auto-engine shutdown features, optimizing efficiency without compromising power or performance.



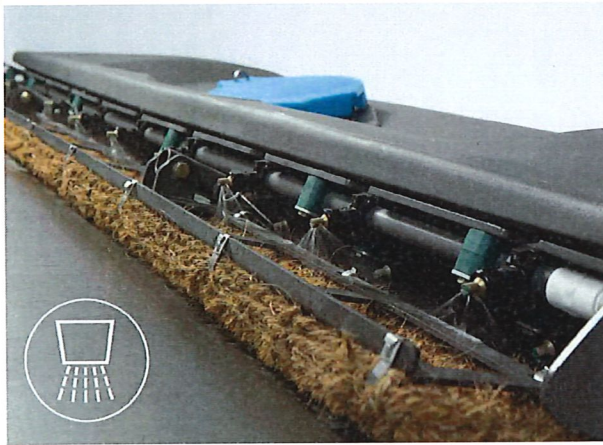


# Peerless productivity

The new Volvo C-Series compactors are primed with a range of intelligent features to boost productivity. Unparalleled drum-wetting is achieved with water burst mode and adjustable flow-rate via the control panel for optimal water usage. Rely on Compact Assist and the Impact Spacing Meter to ensure full functional control. Whether you're on the machine or in an office, monitor your machine to secure peerless productivity and high profits.

## Productivity on tap

Boost productivity with the unique burst mode which runs water pumps and spray bars for 10 seconds, to coat the drums and prevent material pickup. A new water flow-rate calibration process allows the operator to set the minimum flow according to requirements. Optimize water use with the automatic spraying system, providing variable flow proportional to speed, for consistent drum coverage.



## Target compaction

Always travel at the right speed with the Impact Spacing Meter from Volvo, designed to ensure target compaction. The colored indicators are integrated into the display and allow the operator to measure impact spacing in order to aim for optimal 'green zone' use, to ensure a smooth, uniform finish.



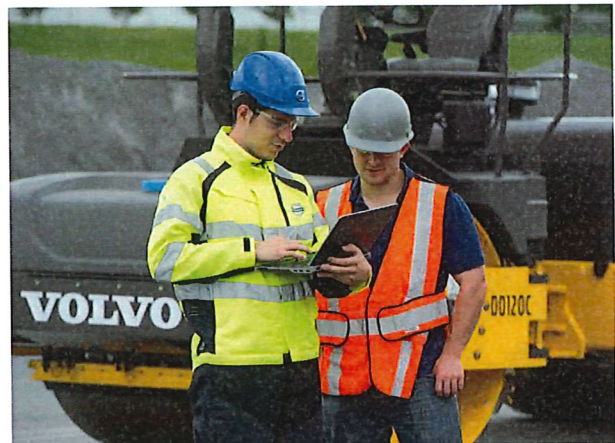
## Machine monitoring made easy

Use the new industry-leading on-board display to access real-time operational information and key diagnostics. Stay informed, receive reports and alarms with CareTrack, Volvo's telematics system. Monitor machine productivity on-board and plan servicing more efficiently, to save time and costs.



## Roll with the experts

With a rich heritage of engineering excellence, you can count on Volvo Construction Equipment to design durable machines, built to work harder and longer. As road experts, our mission is to keep your machines working at the optimum efficiency and productivity required for the job. We help protect your business and your profits from the ground up.







# COMPACT ASSIST

Unlock the full potential of your machine with Compact Assist, the optional Intelligent Compaction system. For an efficient job, Compact Assist offers real-time insight into the work using pass mapping and temperature mapping. When Density Direct is enabled, the operator is able to easily track density values to help eliminate any destructive over compaction.





# EASY MAINTENANCE

Quickly and safely perform routine maintenance with the intelligent design of the Volvo C-Series compactors. For easy service, the industry-leading swing-up hood provides complete access to the engine and hydraulic components, and a single key accesses service hatches. To maximize uptime, fuses and relays are grouped together, and the water tank can be filled from ground level.

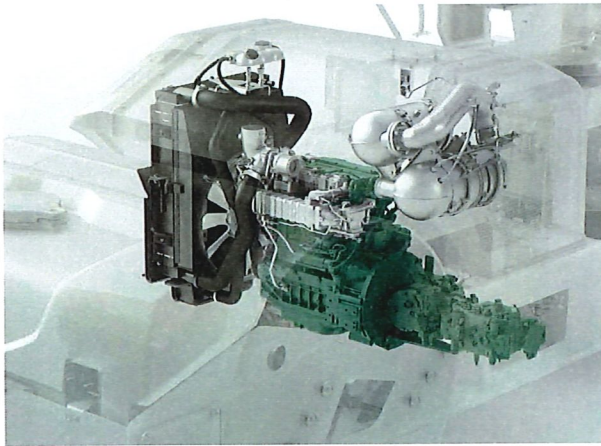


# Maximize uptime

Maximize uptime with easy maintenance of the compactors. Volvo's intelligent design includes the industry-leading swing-up hood for easy service access and passive regeneration which reduces downtime. Durable design, robustly tested components, and an extensive dealer and service infrastructure combine to maximize uptime. Manage your operating costs with our Customer Support Agreements.

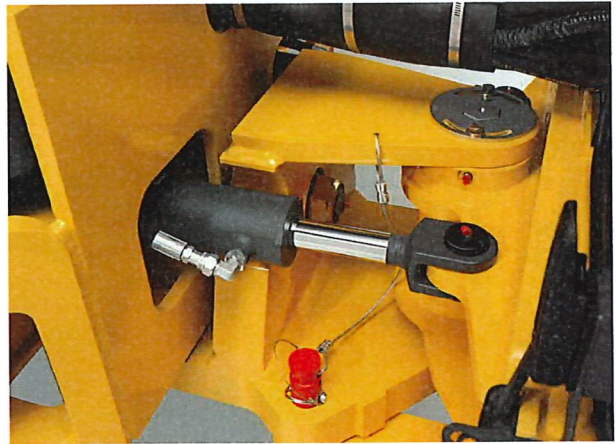
## New mode of regeneration

Passive regeneration occurs in the background as filters are cleaned automatically during normal operation without any input from the operator or effect on performance. A full regeneration is carried out by technicians as part of a routine 500-hour service.



## Durable by design

Built to work, the durable compactor is designed to withstand the harshest conditions using high quality components with detailed engineering in mind. The robust structure features protected components and intelligent hose routing to secure machine uptime and profitability to your business. Retain Volvo quality with Genuine Volvo Parts, extensively tested because every part is vital for uptime and performance.



## Control service costs

We can help support the profitability of your operation. The range of Customer Support Agreements offers preventive maintenance, total repairs and a number of uptime services. Volvo uses the latest technology to monitor machine operation and status, giving you advice to increase machine uptime. By having a Customer Support Agreement you are in control of your service costs.



## Here to support you

Volvo is here to support you whenever you need it. As a complete solutions provider, we listen to your requirements to ensure machine uptime and availability. With extensive dealer coverage and trained technicians, Volvo has a comprehensive network to fully support you using local knowledge and experience.





# Unequaled compaction

## BIG PROJECTS, BIG PERFORMANCE

Ensure high quality compaction with the advanced drum vibration system.

### Drive your costs down

Maximize fuel efficiency with adaptive power, auto-idle and auto-engine shutdown without compromising performance.

### Target compaction

Ensure you always vibrate at the appropriate rolling speed with Volvo's Impact Spacing Meter, for a smooth, uniform finish.

### Roll with the experts

Rely on Volvo's engineering excellence to help protect your business and profits from the ground up.

## COMPACT ASSIST

Maintain consistency and achieve density targets with the intelligently designed Compact Assist, only from Volvo.

### More work, fewer passes

Do more work in fewer passes and achieve target density with the high centrifugal force and the 8 amplitude option\*. \*standard for DD110C







#### **Unobstructed visibility**

Work efficiently with a 360° view of the drum, spray bars and jobsite, optimizing rolling precision and safety.

#### **Comfortably productive**

Boost productivity and comfort with a rotating seat, ergonomic controls, and noise and vibration isolation.

#### **Machine monitoring made easy**

Remotely track machine productivity with CareTrack, ensuring maximum uptime.

#### **New mode of regeneration**

Passive regeneration functions automatically during operation without operator input or effect on performance.

#### **EASY MAINTENANCE**

Optimize efficiency with the swing-up hood for complete access to the engine and hydraulic components.

#### **Productivity on tap**

Optimize productivity with automatic water burst mode and flow-rate calibration to prevent material pick-up.



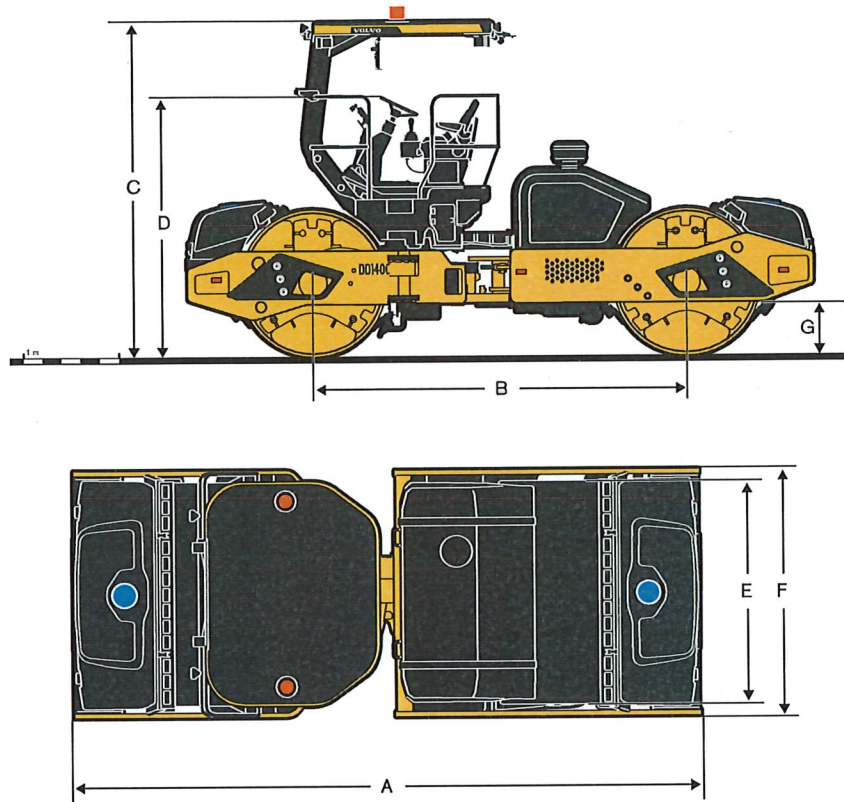
# Specifications

Model			DD110C		DD120C		DD140C	
Machine weights			with open ROPS/FOPS canopy					
Operating weight <sup>1</sup>	kg	lb	11,045	24,355	12,565	27,700	13,828	30,486
Weight @ front drum	kg	lb	5,841	12,880	6,684	14,735	7,328	16,156
Weight @ rear drum	kg	lb	5,204	11,475	5,881	12,965	6,500	14,330
Shipping weight <sup>2</sup>	kg	lb	10,345	22,811	11,791	25,994	13,043	28,755
Drums								
Width	mm	in	1,700	67	2,000	79	2,135	84
Diameter	mm	in	1,300	51	1,400	55	1,400	55
Shell thickness	mm	in	20	0.79	20	0.79	20	0.79
Finish	Machined surface; chamfered and radiused edges							
Propulsion								
Type	Closed-loop hydrostatic, parallel circuit to both drums							
Drum drive	2-speed axial piston motors with planetary gear drive							
Travel speed	km/h	mph	7.5-12.0	4.7-7.5	7.8-12.2	4.8-7.6	7.8-12.2	4.8-7.6
Engine								
Make / model	Volvo D4, EPA Tier 4 final							
Engine type	4 Cyl, Electronic, Turbo charged CAC, EGR, DPF, SCR							
Rated power @ 2,200 r/min	kW	hp	110	148	110	148	110	148
Electrical	24 V DC, 120 A alternator, Starter 5.5 kW, Battery 775 CCA (SAE)							
Brakes								
Service	Dynamic hydrostatic through propulsion system							
Parking secondary	Spring-applied, hydraulic release on both drum drives							
Water system								
Type	Pressure spray drum wetting system with dual water tanks							
Nozzles	Hand-serviceable spray nozzles, 8 per spray bar		Hand-serviceable spray nozzles, 10 per spray bar		Hand-serviceable spray nozzles, 12 per spray bar			
Filtration	Strainer at fill necks, primary filter at each pump, fine filter for each nozzle							
Drum wipers	Front and rear styrene wipers for each drum							
Water tank capacity	l	gal	1,098	290	1,280	338	1,280	338
Miscellaneous								
Articulation angle	+ / - 40°		+ / - 40°		+ / - 40°		+ / - 35°	
Oscillation angle	+ / - 10°		+ / - 10°		+ / - 10°		+ / - 10°	
Inside turning radius (to drum edge)	mm	in	4,025	158	3,772	149	4,562	180
Fuel tank capacity	l	gal	162.8	43	199.8	52.8	219.9	58.1
DEF tank capacity	l	gal	20	5.28	20	5.28	20	5.28
Hydraulic oil capacity	l	gal	121.1	32	149.9	39.6	149.9	39.6
Gradeability (theoretical)	33%		33%		33%		29%	

1 incl. 50% fuel, 50% water, full hyd., 75 kg / 165 lb operator

2 incl. 50% fuel, no water, no operator





#### DIMENSIONS

	DD110C		DD120C		DD140C	
			with open ROPS/FOPS canopy			
	mm	in	mm	in	mm	in
A	5,888	232	5,973	235.2	5,973	235.2
B	3,550	140	3,550	139.8	3,550	139.8
C	3,135	123	3,177	125.1	3,177	125.1
D	2,444	96	2,479	97.6	2,479	97.6
E	1,700	67	2,000	79.0	2,135	84.0
F	1,882	74	2,218	87.3	2,350	92.5
G	483	19	505	19.9	505	19.9

Amplitude Setting	DD110C						DD120C						DD140C					
	Nominal amplitude		Vibration frequency		Eccentric force		Nominal amplitude		Vibration frequency		Eccentric force		Nominal amplitude		Vibration frequency		Eccentric force	
	mm	in	Hz	VPM	kN	lbf	mm	in	Hz	VPM	kN	lbf	mm	in	Hz	VPM	kN	lb
<b>2 amplitudes</b>																		
High Amplitude (Low frequency)	-	-	-	-	-	-	0.89	0.0349	50	3,000	187	42,070	0.88	0.0346	45	2,700	186	41,720
Low Amplitude (High frequency)	-	-	-	-	-	-	0.36	0.014	66.7	4,000	134	30,020	0.35	0.0139	66.7	4,000	163	36,680
<b>8 amplitudes</b>																		
1	0.25	0.010	63.33	3,800	72.2	16,240	0.38	0.0149	56.7	3,400	102.2	22,980	0.33	0.0129	53.3	3,200	97.0	21,810
2	0.29	0.011	63.33	3,800	81.4	18,290	0.40	0.0157	56.7	3,400	108.2	24,330	0.35	0.0137	53.3	3,200	103.4	23,240
3	0.36	0.014	63.33	3,800	102.7	23,090	0.46	0.018	56.7	3,400	123.6	27,780	0.40	0.0159	53.3	3,200	119.4	26,850
4	0.45	0.018	63.33	3,800	127.4	28,640	0.53	0.0208	56.7	3,400	142.8	32,110	0.47	0.0185	53.3	3,200	139.4	31,340
5	0.53	0.021	63.33	3,800	150.1	33,750	0.60	0.0235	56.7	3,400	161.5	36,310	0.54	0.0211	53.3	3,200	158.6	35,660
6	0.59	0.023	63.33	3,800	168.0	37,760	0.65	0.0257	56.7	3,400	176.7	39,720	0.59	0.0231	53.3	3,200	174.1	39,150
7	0.63	0.025	63.33	3,800	179.3	40,300	0.69	0.0271	56.7	3,400	186.5	41,920	0.62	0.0245	53.3	3,200	184.1	41,400
8	0.64	0.025	63.33	3,800	183.1	41,170	0.70	0.0276	56.7	3,400	189.8	42,680	0.63	0.0249	53.3	3,200	187.6	42,170



# Equipment

## STANDARD EQUIPMENT

	DD110C	DD120C	DD140C
<b>Engine</b>			
Battery disconnect switch	•	•	•
V-belt protection	•	•	•
<b>Operator environment</b>			
Open ROPS/FOPS canopy	•	•	•
Operator seat, steering wheel and main controls: rotating +/- 90°	•	•	•
Propulsion control lever	•	•	•
Adjustable steering wheel	•	•	•
2 charger sockets 12V	•	•	•
Anti-slip cab floor, easy to clean	•	•	•
Cup holder	•	•	•
Seat switch with timer delay	•	•	•
Three-point seat belt	•	•	•
Seat belt alarm	•	•	•
<b>Vibration and drum system</b>			
Auto vibration	•	•	•
Selectable vibration: front, rear, both	•	•	•
2 frequencies, 2 amplitudes	—	•	•
8 amplitudes	•	—	—
<b>Electrics and electronics</b>			
4 Halogen work lights in frame (2 on each bumper)	•	•	•
Permanent wetting system water level display	•	•	•
Permanent fuel level display	•	•	•
Information display:	•	•	•
- Fluid temperatures	•	•	•
- Engine speed	•	•	•
- Vehicle speed	•	•	•
Impact meter	•	•	•
Emergency stop button	•	•	•
<b>Water system</b>			
Two spray bars per drum	•	•	•

## OPTIONAL EQUIPMENT

	DD110C	DD120C	DD140C
<b>Vibration and drum system</b>			
8 amplitudes	—	•	•
<b>Electrics and electronics</b>			
4 LED frame lights	•	•	•
4 LED frame lights and 4 LED canopy lights	•	•	•
Drum Edge, Surface, and Step Lights	•	•	•
Light ready kit	•	•	•
4 frame Halogen lights	•	•	•
Rotating beacon	•	•	•
Back up alarm	•	•	•
Compact Assist	•	•	•
Compact Assist with Density Direct	•	•	•
CareTrack	•	•	•
Caretrack Anti-theft	•	•	•
Asphalt temperature gauge kit	•	•	•
<b>Structure</b>			
Special paintwork	•	•	•
Biodegradable hydraulic oil	•	•	•
<b>Other</b>			
Cocoa Mats	•	•	•
Auto-idle shutdown	•	•	•
Fuel Strainer	•	•	•
Maintenance Package	—	•	•
Metric Tool Kit	•	•	•
Fire Extinguisher mounting bracket	•	•	•



## SELECTION OF VOLVO OPTIONAL EQUIPMENT

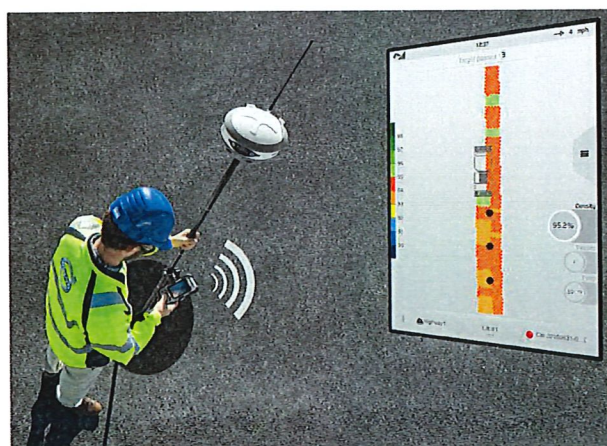
**LED Lights (4 or 8) and rotating beacon**



**Air pre-cleaner**



**Compact Assist**



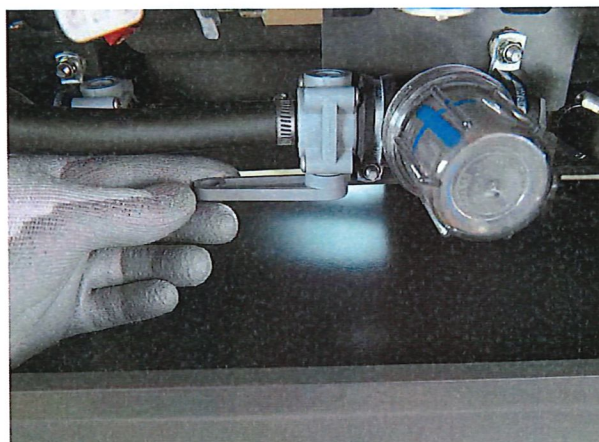
**Eight-amplitude (standard for DD110C)**



**Auto-idle / Auto-engine shutdown**



**Quick drain freeze prevention**



Not all products are available in all markets. Under our policy of continuous improvement, we reserve the right to change specifications and design without prior notice. The illustrations do not necessarily show the standard version of the machine.



**VOLVO**

**Volvo Construction Equipment**

[www.volvoce.com](http://www.volvoce.com)





**Volvo Construction Equipment North America**  
**Warranty – Disclaimers – Limitations**  
**Limited Warranty**

Volvo Construction Equipment North America ("Volvo CE") hereby extends to its authorized dealers ("Dealer") and the Dealer's end-use customers ("Customer", and both Dealer and Customer are referred to herein as a "Buyer"), who purchase a new Volvo construction equipment machine ("Machine") or new Volvo part ("Part", both of which are referred to herein as a "Product") from Volvo the following limited warranty:

Subject to the exceptions and limitations set forth below, Volvo CE or Dealer will repair or replace any part of a new Machine or new Part which proves to be defective in material or workmanship during the following periods (the "Warranty Period"):

- Volvo wheel loaders: 12 months/2500 hours, whichever first occurs
- Volvo articulated haulers: 12 months/2500 hours, whichever first occurs
- Volvo hydraulic excavators: 12 months/2500 hours, whichever first occurs
- Volvo motor graders: 12 months/2500 hours, whichever first occurs
- Volvo compactors: 12 months/2500 hours, whichever first occurs
- 24 month unlimited hours on DD90 and larger compactors
- Volvo pavers: 12 months/2500 hours, whichever first occurs
- 24 month unlimited hours on 6000 / 7000 series pavers
- Volvo milling: 12 months/2500 hours, whichever first occurs
- Volvo compact wheel loaders (up to 100 net hp.): 12 months/unlimited hours
- Volvo skid steer loaders: 12 months/unlimited hours; Lifetime arm for one-sided
- Volvo compact hydraulic excavators (less than 11 metric tons): 12 months/unlimited hours
- Volvo backhoe loaders: 12 months/unlimited hours
- Volvo engines: 12 months/2500 hours, whichever first occurs
- Volvo parts: 6 months/1500 hours, whichever first occurs
- Volvo remanufactured components: 12 months/2500 hours, whichever first occurs
- Volvo Attachments: 12 months

The Warranty Period commences immediately following the delivery of said Product to the Buyer who first puts said Product into use. The foregoing limited warranty shall include the labor cost to accomplish the repair or replacement of the defective part provided that the repair or replacement was performed by a Dealer.

The foregoing warranty does not cover: (i) any Product found to have been damaged by abuse, accident, other casualty or a failure to maintain or use the warranted Product in accordance with the applicable manuals or instructions (Buyer is required to use only original equipment manufacturer filters during the Warranty Period); (ii) the labor costs to repair or replace defective Parts after the expiration of the Warranty Period of the Machine in which such Part is located; (iii) overtime labor premiums; (iv) costs and expenses associated with the transportation of Dealer's service personnel to and from the location of the warranted Product; (v) any parts, components, attachments or accessories for which Buyer receives a separate warranty by the manufacturer or producer thereof (in specified cases said warranty may be administered by Volvo CE); (vi) maintenance items or ground engaging parts that have achieved their normal service life.

**DISCLAIMER OF IMPLIED WARRANTIES AND LIMITATION OF REMEDIES**

THE FOREGOING WARRANTY TO BUYER IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

REMEDIES AVAILABLE TO BUYER ARE LIMITED TO MAKING A CLAIM UNDER THE FOREGOING WARRANTY AND ARE EXCLUSIVE AND EXPRESSLY LIMITED TO OBTAINING THE PARTS AND LABOR IN ACCORDANCE WITH THE TERMS OF SAID WARRANTY.



## **Warranty – Disclaimers – Limitations**

### **LIMITATIONS OF LIABILITY AND DAMAGES**

Regardless of whether a claim against Volvo CE or Dealer is based on the foregoing warranty or is an action in contract, tort (negligence or strict liability) or otherwise, their respective liability for losses, damages or expenses of any kind arising from the design, manufacture, repair or sale of the Products is limited, unless otherwise prohibited by law, to an amount not exceeding the cost performing the obligations contained in the foregoing warranty, and in no event shall their respective or joint liability exceed the value of the Product or part thereof giving rise to such liability.

### **CONSEQUENTIAL AND SIMILAR DAMAGES NOT RECOVERABLE**

Except for performing the obligations of the foregoing warranty in accordance with its terms, Volvo CE and Dealer shall have no liability for loss, damage, or expense, directly or indirectly, attributable to a loss of use of a Product, loss or damage to property other than the Product, loss or damage to the Product or any part thereof or any other economic or commercial loss, including, without limitation, lost profits or special or consequential damages (except liability for any type of consequential damages which by law may not be disclaimed). The parties intend that this prohibition against consequential and similar damages will survive and be effective even if the limitation of remedies in the foregoing sections is found to fail of its essential purpose under section 2-719 of the Uniform Commercial Code.

### **ALLOCATION OF RISK**

The foregoing warranty disclaimers, limitations of liability and limitation of remedies are bargained allocations of risks among (i) the Customer who purchased the Product; (ii) the Dealer who sold the Product, and (iii) Volvo CE, which is a third party beneficiary of the contract of sale between the Customer and the Dealer. The Buyer of the Product accepts the foregoing warranty and the other bargained for allocations of risk as part of the agreed price for the purchase of the Product to which the foregoing warranty applies. Volvo CE is prepared to offer different warranties and other allocations of risk for other prices. However, any such change in the warranty or the allocation of risks must be confirmed in writing by Volvo CE.

### **STATUTE OF LIMITATIONS**

Any action by a Buyer of a Product for breach of contract, for breach of warranty arising under, or for a cause of action arising out of the sale of a Product, whether based on contract, tort (negligence or strict liability) or otherwise, shall be commenced within one (1) year after the cause of action has accrued. Any such cause of action shall be deemed to have accrued at the earlier of (i) the discovery of the defect or breach, or (ii) the expiration of the applicable Warranty Period.