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# Product Bulletin

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July 2007

## Cat® 319D L / Cat® 319D LN Hydraulic Excavators



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### For Dealer Sales Personnel

This document supplements information in the Specalog. Marketing content will be available only on secured dealer extranets and by accessing the PDF in the Sales Library on FlashNet.



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## Overview

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Performance, Reliability and Ergonomics of the C-Series hydraulic excavators are well perceived by our customers. The introduction of the D-Series is the opportunity to carry over these strengths and also bring new key drivers, essential in our changing environment.

Our development team focused on :

- **Environmental Compliance,**
- **Lower Owning & Operating Cost,**
- **Performance and Versatility Continuity.**

This bulletin describes the user benefits and technical improvements of the 319D. It compares key features, specifications of this new model with the former C-series 318 and 319.

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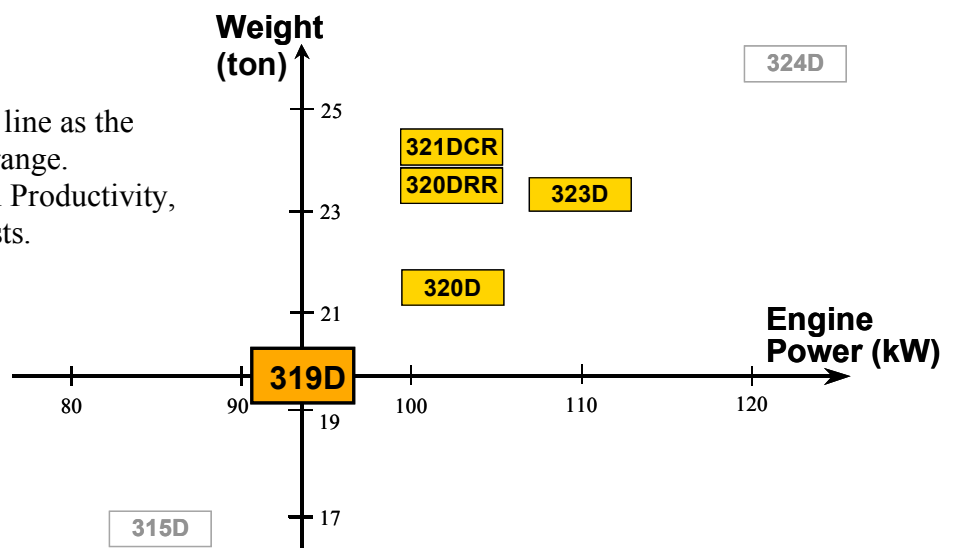
## Introduction / Positioning

The 319D is available in 2 versions :

- A Long undercarriage version (319D L) that replaces the 318C L,
- A Long undercarriage Narrow gauge version (319D LN) that replaces the 319C LN.

In addition, a large and diverse choice of options allows specific market machine configuration.

The 319D is positioned in the product line as the entry model to the popular 20-25 ton range. It is an excellent compromise between Productivity, Versatility and reduced Operating Costs.



## Hydraulics

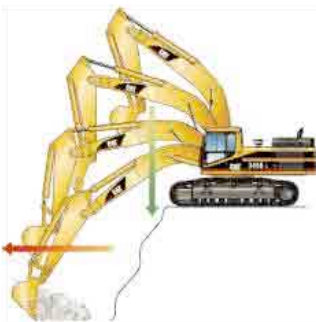
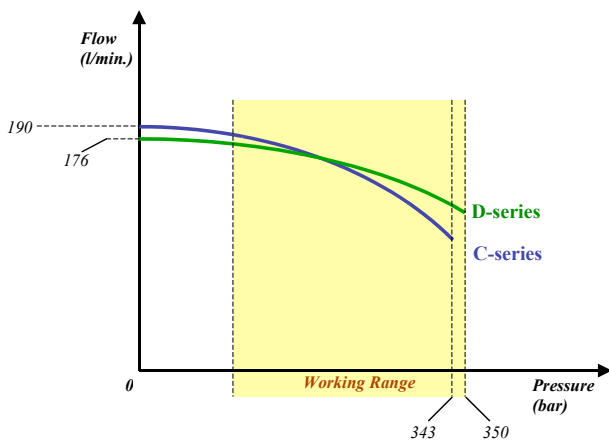
The hydraulic system of the 319D takes benefits of major changes that improve its efficiency and ease of operation.

The maximum hydraulic pressure is increased by 2% and the counterweight weight by 300kg, resulting in :

- 2% increase in Bucket and Stick digging force,
- 2% increase in Drawbar pull (207 kN),
- 6% increase in Lifting capacities (over the front).

The improved D-series hydraulic system offers superior efficiency at high pressure. The 319D shows more hydraulic power in the working range.

- The new main valve features a standard **2-Pump-Flow** hydraulic capability. This makes the maximum flow of both pumps available for bigger tools and heavier applications,
- The **Smart Boom** feature let the boom operating down by its own weight, without any hydraulic constraint. It is a benefit in terms of efficiency, reliability, comfort and fuel consumption. The Smart Boom option is available as standard with the Boom Lowering Check Valve attachment,
- A new **Leveling Mode** is available as an option. This mode regulates the hydraulic priority, especially during the boom-up / stick-in leveling movement. The improved controllability results into a finer surface finish.



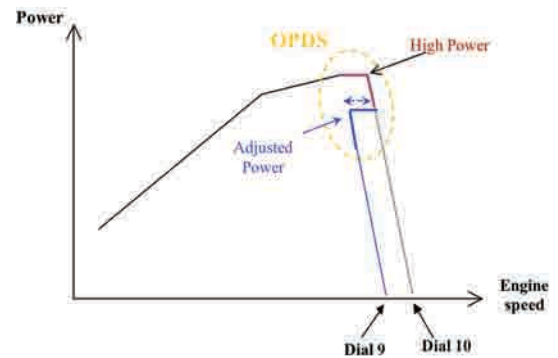
## Economy Mode

The 319D provides a fuel Economy Mode selected through the Monitor. This function limits the engine speed as well as hydraulic power. From dial 1 to 10, the Economy Mode provides the best compromise between fuel consumption and performance in light and medium duty applications. The Economy mode acts on every hydraulic movement except Travel and Auxiliary Hydraulics.

# Performance and Environmental Compliance

## ODPS (On Demand Power Supply)

During lighter load conditions that last for more than 5 seconds in the hydraulic circuit, ODPS automatically reduces engine speed to an RPM level equivalent to dial 9 in order to adjust the power to the load. Thanks to ODPS, your customers can save fuel by reducing consumption when the machine does not require high power. ODPS increases engine RPMs almost immediately when a heavier load (increased hydraulic pressure) is detected. In lighter load conditions, although the operator may notice a decrease in engine RPMs, note that the overall speed of the hydraulics cycle remains unchanged as well as the productivity. Conversely, when ODPS delivers high power, the operator may notice an increase in engine speed. ODPS also participates to the overall machine sound level reduction.



## ACERT Engine

The C4.2 ACERT engine replaces the 3066T engine of the 318C / 319C.

The ACERT Technology focuses on an optimized combustion to reduce emissions, better than recycling the exhaust gas. It capitalizes on Caterpillar's proven leadership in three core engine systems: fuel system, air management system and electronic control. These technologies assure a precise control of the combustion cycle.

ACERT is a unique and revolutionary system that allows Cat engines to meet today's clean air regulations, and establishes the building blocks for attaining tomorrow's more stringent standards.



## High Ambient Cooling packages

High Ambient Cooling package enables the machine to work in ambient temperatures up to 52°C by derating hydraulic pump flow.

Two High Ambient Cooling Packages are offered :

- The current one for European regulated countries,
- A new one for the countries that have not adopted EU regulations.

This absence of sound regulation allows the use of a different engine compartment design. Reduction of sound panels and addition of perforations increase the airflow and cooling capability. Therefore, less hydraulic deration is required to meet the same ambient temperature capability as European regulated versions.



## Performance (Production Study)

All these new technical features bring real benefits to our customers who can verify with the new 319D a really performing machine. The following production study compares a 318CL to a 319DL and shows the impact of all these improvements on Productivity and Fuel Consumption.

Caterpillar performed production tests in April 2007, at the Malaga demonstration center in Spain.

The 318C and 319D machines with equivalent configurations, equipped with the same quick coupler, and using the same bucket ran performance tests on the same ground.

Both machines ran a boom-up power test to verify that both machines produced the same hydraulic power.

2 applications typical of this size class were selected:

- Truck loading,
- Trenching.

The quantity of fuel burnt was measured using a fuel meter mounted on the machine fuel lines.

Weather conditions remained dry and partly cloudy during the test period.

Each test was run several times until 3 runs with similar results were obtained for each machine, in order to eliminate inconsistent runs from the test. All machines operated with air-conditioning on, SmartBoom off, and lights off.



### Machines Specifications

<b>Data</b>	<b>318C L</b>	<b>319D L</b>
Serial number	DAH01060	BZH00155
Year	2006	2006
Service hours (h)	30	800
Undercarriage (mm)	4450 (long)	4450 (long)
Track Gauge (mm)	2200	2200
Track shoe width (mm)	600	600
Boom (mm)	5300	5300
Stick (mm)	2700 (long)	2700 (long)
Counterweight (kg)	3300	3900 (HD)
Quick coupler	CW 30	CW 30
Bucket (m <sup>3</sup> )	1.03	1.03
Bucket width (mm)	1300	1300
Engine model	3066T	C4.2
Engine emissions regulation	Tier II	Tier III
Engine net power (kW/hp)	93/126	93/126
Operating weight (kg)	20200	19800



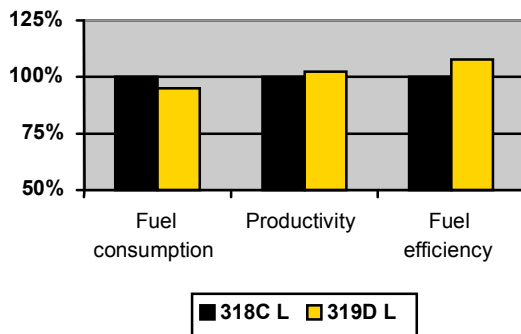
## Performance (Production Study)



### Truck Loading (319D L in standard mode)

#### Protocol

Both trucks and excavator were at the same level. The truck was positioned so that the machine swings at 90 degrees to load it. Excavators sat in the same bench position. After each run, trucks were loaded material in the same place, to be used for the next loading run, to ensure a better consistency of material during the test. Each excavator loaded 2 trucks with 8 buckets. The exchange time between trucks was excluded from the cycle time. Each truck was weighed (full and empty) to measure the exact amount of material loaded.



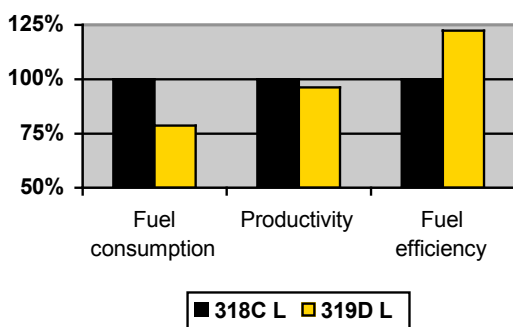
Results	318CL	319DL	319DL adv.
Average total cycle time	24.62	24.01	
Fuel consumption (l/h)	25.84	24.51	- 5%
Productivity (ton/h)	324.62	332.04	+ 2%
Fuel efficiency (ton/l)	12.56	13.55	+ 8%

The 319D L out-produced the 318C L in truck loading. However, the most noticeable difference is the 5% advantage in fuel consumption for the 319DL.

### Truck Loading (319D L in Economy mode)

#### Protocol

Same protocol as above was used, except the 319D L operated in Economy mode.



Results	318C L	319D L	319D L adv.
Average total cycle time	24.62	25.49	
Fuel consumption (l/h)	25.84	20.33	- 21%
Productivity (ton/h)	324.62	312.57	- 4%
Fuel efficiency (ton/l)	12.56	15.38	+ 22%

In Economy mode, the 319D L was 4% less productive than the 318C L. The fuel consumption advantage was clear, with 21% less fuel consumption for the 319D L.

**Trenching  
(319D L in standard mode)**

**Protocol**

The test ground was prepared by digging material (sandy clay) from the area, putting it again in place, and using an 825H soil compactor, to ensure density consistency in the material used for the test. Density was measured at 1.6 Ton/m<sup>3</sup>.

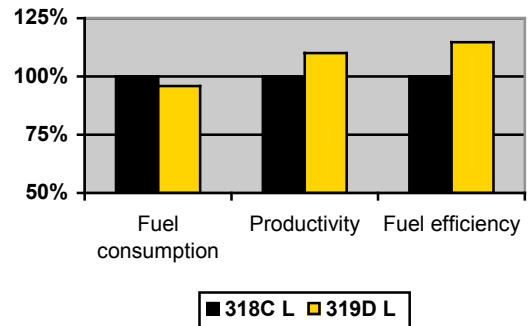
The machine was timed while digging a trench that was 3 meter deep, 25 meter long and one bucket wide. For the last 5 meters, the trench depth was reduced from 3 meters to the surface.

The machine operator stockpiled dug material by the side of the trench. The depth of the trench was checked every 5 meters. At the end of the test, the volume of the trench and the amount of fuel burnt were measured.

Each test was performed three times for each machine, using the same procedures.



<b>Results</b>	<b>318C L</b>	<b>319D L</b>	<b>319D L adv.</b>
Average total cycle time	16.82	15.80	
Fuel consumption (l/h)	26.47	25.39	- 4%
Productivity (m <sup>3</sup> /h)	152.96	168.23	+ 10%
Fuel efficiency (m <sup>3</sup> /l)	5.78	6.62	+ 15%



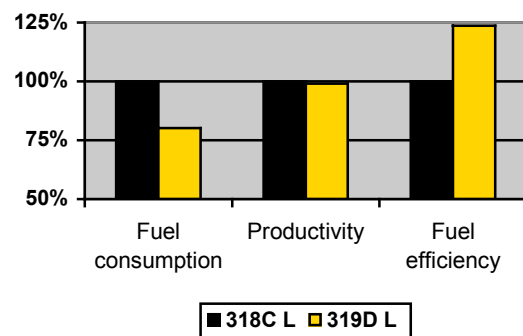
In trenching, the 319D L was 10% more productive than the 318C L. Its fuel consumption was 4% less than the 318C L.

**Trenching  
(319D L in Economy mode)**

**Protocol**

Same protocol as above was used, except the 319D L run in Economy mode.

<b>Results</b>	<b>318C L</b>	<b>319D L</b>	<b>319D L adv.</b>
Average total cycle time	16.82	16.78	
Fuel consumption (l/h)	26.47	21.22	- 20%
Productivity (m <sup>3</sup> /h)	152.96	151.54	- 1%
Fuel efficiency (m <sup>3</sup> /l)	5.78	7.14	+ 24%



In Economy mode, the 319D L production was similar (-1%) to that of the 318C L. Its fuel efficiency was excellent, compared to the 318C L. Again, this confirms that the economy mode will provide a significant fuel cost advantage in utility applications

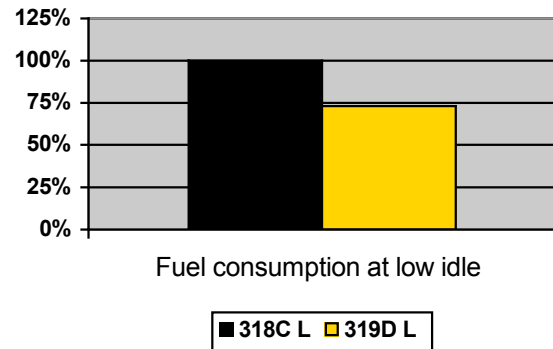
## Performance (Production Study)



### Consumption at low engine idle

<b>Results</b>	<b>318CL</b>	<b>319DL</b>	<b>319DL adv.</b>
Fuel consumption (l/hr)	3.3	2.4	-27%

319D L fuel consumption at low idle was 27% lower than the 318C L, thanks to the use of an ACERT 4-cylinder engine in the 319D L.



### Conclusion

This production study demonstrated a significant improvement in fuel efficiency, thanks to the new ACERT 4-cylinder C4.2 engine, more efficient hydraulic system and optimized structures. Customers will clearly notice improvements that can save about 20% on his fuel bill while keeping the same productivity as a C-series machine.

## Tool Control

The standard Tool Control allows now to pre-set up to 10 different hydraulic work-tools with their appropriate flow and pressure conditions. The Tool Control System is easily accessible through the monitor. A switch is also located on the right hand console to directly skip to the next preset tool.



## Hydraulic Configurations

On the C-series, the Tool Control configuration was only available within the most complete “Versatility” package. With the D-series, the High Pressure (HP) hydraulic circuit, Medium pressure (MP) hydraulic circuit and pilot controls are available into separated and combinable references for a more flexible build of order. (see table below)

Hydraulic Circuits				Pilot Controls					
-HP- Single action (1 way)	-HP- Combined Function (2 way)	-MP-	-HP- VA Boom	Joystick 4 buttons	Joystick Thumbwheel	Left pedal modulation	Left foot switch		
	N.C.	C	C	S.O.		C.B.W	C.B.W	-HP- Single action (1 way)	Hydraulic Circuits
		C	C	S.O.		C.B.W	C.B.W	-HP- Combined Function (2 way)	
			C	S.O.		C.B.W	C.B.W	-MP-	
				S.O.		N.C.	N.C.	-HP- VA Boom	
N.C.	Not Compatible				N.C.	C	C	Joystick 4 buttons	Pilot Controls
C	Compatible					C	C	Joystick Thumbwheel	
S.O.	Select One						N.C.	Left pedal modulation	
C.B.W	Can Be used With							Left foot switch	

## Versatility

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### Undercarriage

The 319D model provides two width of undercarriage :

- The L is the widest version (track gauge 2.20m). It corresponds to the former 318CL model.
- The LN undercarriage is the narrow version (track gauge 1.995m). It replaces the 319CLN model, adapted to specific transport constraints.



### Variable Angle Boom

The new main valve installed in the 319D was improved to dedicate an independent section to the VA-Boom. The C-series used the same high-pressure circuit for both VA Boom and Auxiliary functions, and required a diverter valve for an alternate use. Now VA-Boom and tools can work simultaneously. The new VA-Boom standalone system includes a specific left-hand side pedal.

### Stick and Bucket Pins

Stick and bucket pin diameters are unchanged from 318/319C to 319D. This means the sticks, buckets and linkages are fully compatible between C and D-series.

### Universal Quick Coupler

A new Universal Quick Coupler control now accepts all hydraulic quick coupler systems with pressures ranging up to full machine pressure (350 bar). The pressure is manually adjustable with a relief valve located near the Quick Coupler valve. A Quick Coupler control switch is located on the right hand cab panel.



### Bottom Guards

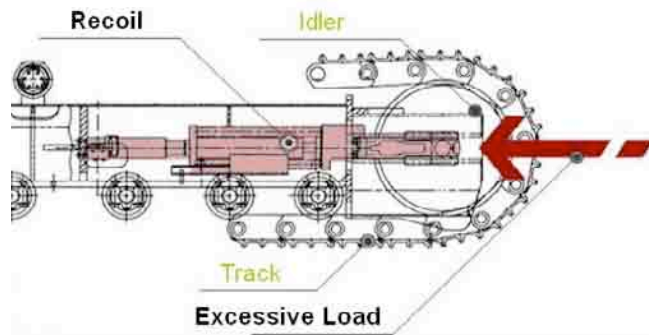
The offer about bottom guard attachments has improved with the D-series. The “heavy duty” attachments, including a 6mm thick bottom guard, swivel guard and heavy duty track motor guard were offered as a package in the C-series. The 319D now offers them as independent options.





### Undercarriage

The 319D undercarriage is highly resistant and durable, integrating parts of the 323D (Idler shaft, links and shoes) and rollers of the 320D. It allows the 319D to work in similar ground conditions as other 20-25 ton excavators.



### Spring Recoil System

The recoil system stroke is increased by 26%. This brings a better absorbing system that relieves abnormal track tensions and improves the machine reliability.



### Hydraulic Return Filter

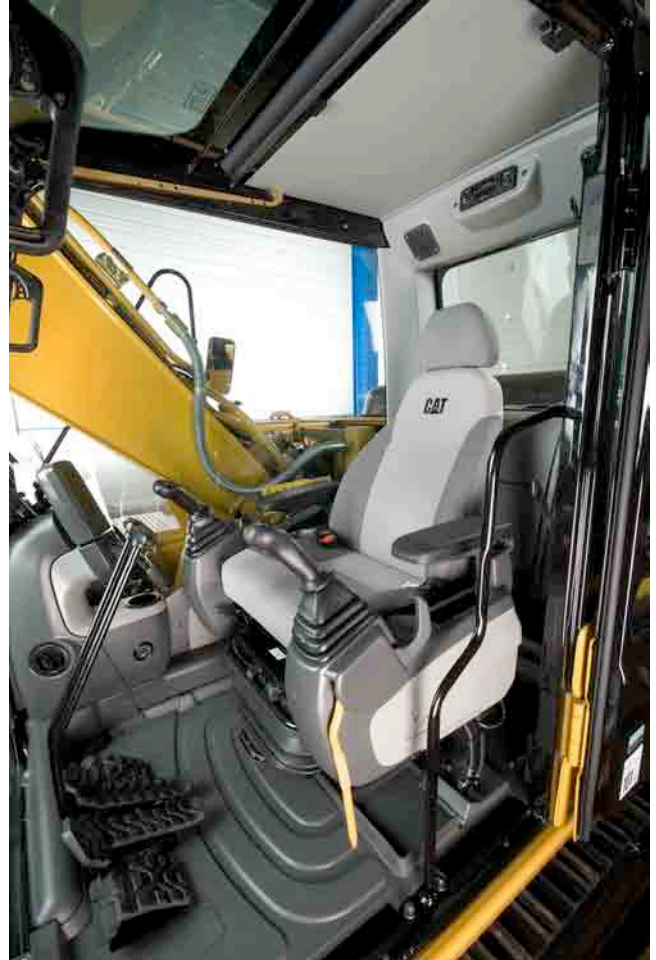
Like the 319C or the 318C, the 319D is equipped with cartridge-type hydraulic return filter to avoid contamination during service operations. The filter can be changed cleanly without any oil spillage. The filter size of the D-series is brought down to 2 micrometers. A sensor linked to the filter indicates on the cab monitor if the filter is clogged.

## Operator Comfort

### Cab Layout

C-Series superior Visibility, Comfort and Ergonomics remain part of the D-series cab design that also bring new features :

- Windshield offerings :
  - ♦ 50/50 split,
  - ♦ 70/30 split,
  - ♦ 1-piece,
  - ♦ 1-piece high resistant,
- Suppression of the cross bar between the front windshield and the polycarbonate skylight, increasing visibility,
- The cab's interior layout has been redesigned for better access to the switches,
- High back seat configuration is now standard for a better level of comfort.



### Timer Delay

With this option, the cab lights will stay on for a time to set from 0 to 90 seconds. In dark environments, the driver can safely leave the machine.

### Monitor

The 319D uses a full-color graphical display monitor as man-machine interface. The monitor can display a variety of information (about machine, maintenance, diagnostic and prognostic), in more than 20 different languages.

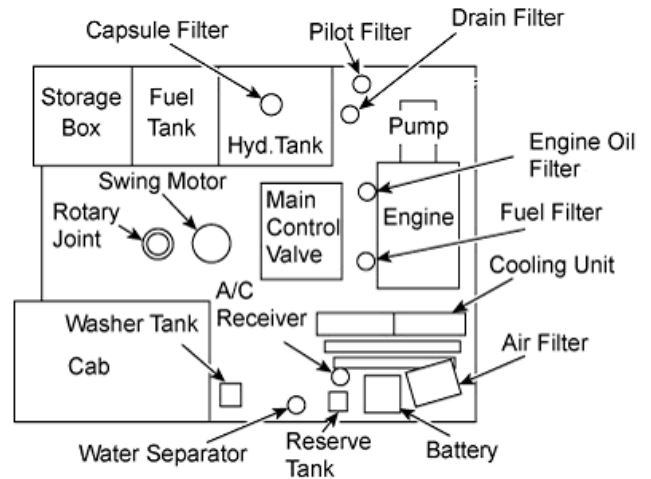
- Compact and refined monitor,
- Full Graphic, Full color and Video Ready display,
- Monitor displays recommended maintenance action items such as change of filters and oil.



# Maintenance & Serviceability

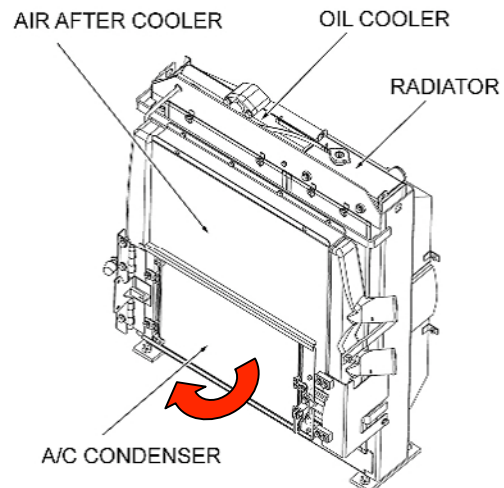
## Maintenance Items

The 319D was designed to allow an easy access to the maintenance points. Most of the maintenance points are the same as they were on the C-series and can be reached at ground level. Maintenance operations are optimized and machine unavailability is reduced.



## Swing-out A/C Condenser

The Air Conditioning condenser is a standard swing-out installation. In addition, a side-by-side radiator / oil cooler make the cleaning operation of the cooling elements easy.



## Service Intervals

The 319D offers the same long service intervals for the maintenance items as on the 318/319C. In addition, the hydraulic return filter (capsule filter) change interval is extended from 1000 to 2000 hours.

## Appearance

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The new trade dress applied to the D-series excavators includes :

- A new counterweight,
- Increased black surfaces on the cab and cylinders,
- Redesigned CAT logos.



### Counterweight



### Black painted elements



### CAT logo

## Specifications

### Comparison – 319D versus 318C / 319C

<b>Engine</b>	<b>319D</b>	<b>318C / 319C</b>
Engine model	CAT C4.2 ACERT	CAT 3066T
Net Power (kW / hp)	93 / 126	94 / 128
Nb of Cylinders	4	6
Bore (mm)	102	102
Stroke (mm)	130	130
Displacement (l)	4.2	6.4

<b>Weights</b>	<b>319D</b>	<b>318C / 319C</b>
Operating Weight ( <i>L version, reach boom, 2.7 stick, 600mm shoes</i> )	19500	20200
Counterweight - std / Heavy Duty (kg)	3600 / 3900	3300 / 3600

<b>Hydraulic System</b>	<b>319D</b>	<b>318C / 319C</b>
Main Implement System – Max. flow (2x) (l/min)	176	190
Main Implement System – Max. pressure (bar)	350	343
Travel System – Max. pressure (bar)	360	343
Swing System – Max. pressure (bar)	230	230
Pilot System – Max. flow (l/min)	26.7	32.5
Pilot System – Max. pressure (bar)	41	41
Boom Cylinder – Bore (mm)	120	120
Boom Cylinder – Stroke (mm)	1193	1193
Stick Cylinder – Bore (mm)	130	130
Stick Cylinder – Stroke (mm)	1364	1364
Bucket Cylinder on 2.7 stick – Bore (mm)	110	110
Bucket Cylinder on 2.7 stick– Stroke (mm)	1048	1048

<b>Drive</b>	<b>319D</b>	<b>318C / 319C</b>
Overall length (mm)	4450	4450
Track Gauge – L version (mm)	2200	2200
Track Gauge – LN version (mm)	1995	1995
Max. Drawbar Pull (kN)	207	196
Max. Travel Speed (km/h)	5.0	5.3

<b>Swing Mechanism</b>	<b>319D</b>	<b>318C / 319C</b>
Swing Speed (rpm)	11.3	10.5
Swing torque (kN/m)	50.8	48.5

<b>Service Refill Capacities</b>	<b>319D</b>	<b>318C / 319C</b>
Fuel Tank (l)	300	320
Cooling System (l)	11	13
Engine Oil (l)	19	30
Swing Drive (l)	8	8
Final Drive – each (l)	8	13
Hydraulic System – including tank (l)	190	188
Hydraulic Tank (l)	106	105



## **Caterpillar 319D L / 319D LN Excavator**

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