

**MAHLE**

*Driven by performance*

# GREAT PARTS FOR GREAT ENGINES

## CLEVITE REPLACEMENT PARTS FOR CAT<sup>®</sup> 3406E/C15

HEAVY DUTY REPLACEMENT PARTS OFFERING

AFTERMARKET



**VICTOR REINZ<sup>®</sup>**

Sealing Products

**CLEVITE**

# GREAT PARTS FOR GREAT ENGINES!

The challenge for engineers was finding a way to create pistons capable of handling the nearly 40% increase in power output produced by the new diesel engines as standard aluminum was no longer enough. MAHLE engineers introduced the patented FERROTHERM® piston. This piston featured a crown of temperature resistant forged steel along with an aluminum skirt.

## **TWO UNEQUAL PARTNERS – ONE SUCCESSFUL COOPERATION**

How do you combine two materials as different as steel and aluminum into one functional unit? Combustion and ignition pressures have their effect on the steel head – and the resulting force is directly transmitted from the head via the piston pin to the connecting rod. A gap is left between the upper steel section and the aluminum skirt. This spatial separation acts as thermal decoupling. The temperatures at the skirt are significantly lower compared to a piston made entirely from aluminum. Thanks to the low temperature level at the piston skirt and the decoupling of the power transmission, the skirt design could be optimized in respect of its guiding task. This can be noticed in the smooth running engine despite harsh diesel combustion – at higher power output and more torque.

A design that is based on clear task sharing: the aluminum skirt only takes care of guiding the piston in the cylinder bore, while the piston head does the hard work and the sealing. The forged steel of the piston head permits significantly higher operating temperatures and significantly higher surface pressures between boss and piston pin. Also, the wear resistance and service life of the ring grooves benefit from the high strength of the forged steel.

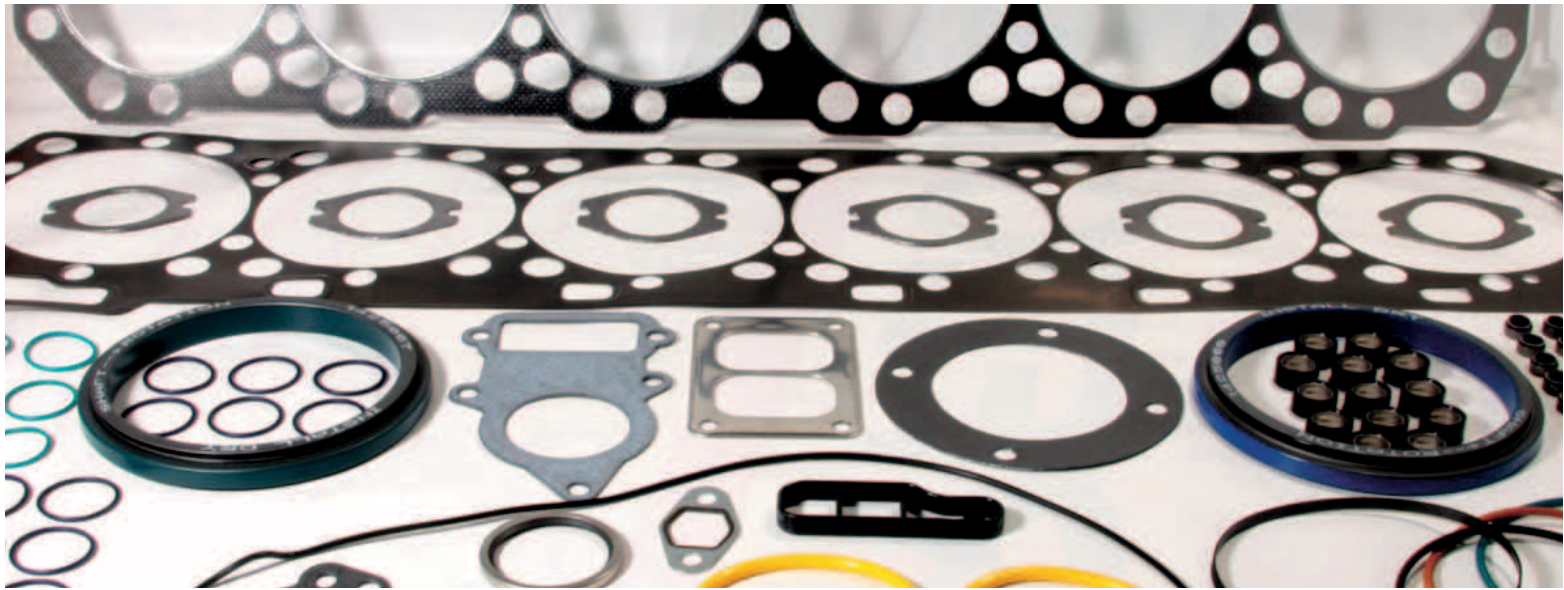
## **TOP LAND CLEARANCE**

An additional important advantage of steel is its significantly lower thermal expansion coefficient. This allows smaller clearances between piston and cylinder at the top land, offering improved sealing and reduced blow-by. The small top land clearance also has a positive effect on exhaust emission values – smaller clearance means less clearance volume and therefore optimal and clean combustion.

## **THE TRICK WITH THE SHAKER**

Steel also has a disadvantage: Thermal conductivity is worse than aluminum. To counter this, MAHLE engineering developed solutions: channels through which engine oil is injected for cooling. Due to the large diameter and the up and down movement of the piston, a so-called shaker effect is generated, which cools the piston head sufficiently.

**MAHLE Clevite Inc. now offers the FERROTHERM® piston replacements for the Caterpillar 3406E.**

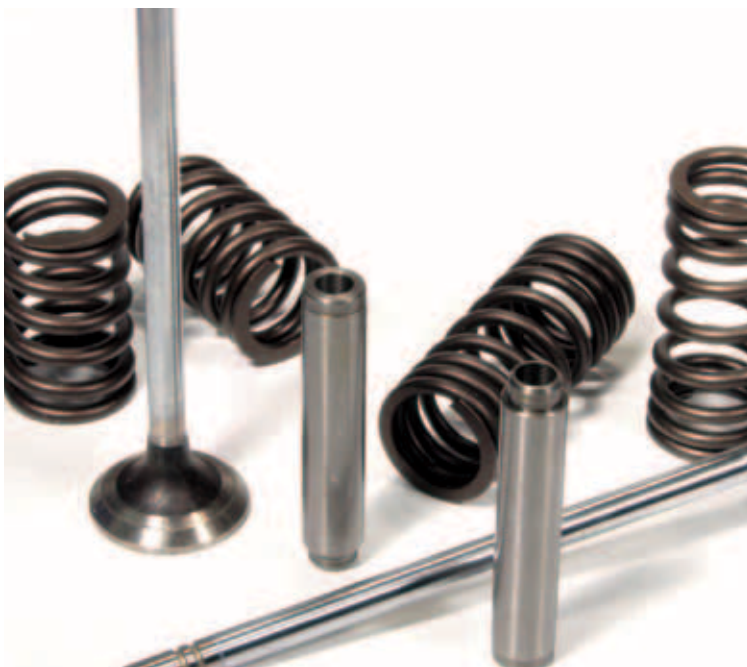


# GASKETS

PART #	DESCRIPTION	INTERCHANGE	NOTES (IF APPLICABLE)
EK3535VR	Gasket Set, Inframe Overhaul	2161252, 4N1151(2)	
EK3536	Gasket Set, Inframe Overhaul	2486740(1) + 4N1151(2)	
EK3537	Gasket Set, Inframe Overhaul	2486744 / 2572754 / 2969934 / 3164810 / 3211418 + 1685248	Isolation pan gasket
EK3538	Gasket Set, Inframe Overhaul	2486744 / 2572754 / 2969934 / 3164810 / 3211418 + 4N1151(2)	Paper pan gasket
HS54214-1	Gasket Kit, Cylinder Head Set	2161252	Single valve cover
HS54214-2	Gasket Kit, Cylinder Head Set	2486740	3 piece valve cover
HS54643-1*	Gasket Kit, Cylinder Head Set	2486744 + 1296744(6) + 5P5678	Strip Rocker Cover
HS54643-2*	Gasket Kit, Cylinder Head Set	3164810	
HS54643-3*	Gasket Kit, Cylinder Head Set	2572754	
HS54643-4*	Gasket Kit, Cylinder Head Set	2969934 / 3211418	Consolidated set
HS54643-6*	Gasket Kit, Cylinder Head Set	2486744 + 1299452(6) + 2720390	Molded Rocker Cover
HS54643-7*	Gasket Kit, Cylinder Head Set	3164810 + 2720390	
54214	Gasket, Cylinder Head	1539653	
54643*	Gasket, Cylinder Head	2245122	
VS50445	Gasket Set, Valve Cover	2429539(1),1497348(6)	
VS50464	Gasket Set, Injector Change	9X7417(6) + 9X7418(6) + 9X7419(6) + 1497378(1) + 2429537(3) + 5P5678(3Meters)	Strip Rocker Cover
B45978	Valve Stem Seal	1632478	
GS33507	Injector O Ring Set, 6 Required	1662903 + 1662904 + 9X7430	
GS33521	Injector O Ring Set, 6 Required	1895390	
VS50471	Gasket Set, Injector Change	9X7417(6) + 9X7418(6) + 9X7419(6) + 1497378(1) + 2429537(3) + 2720390(1)	Molded Rocker Cover
CS54214-1	Gasket Set, Lower	1248899	
CS54214-2	Gasket Set, Lower	1309035	
CS54214-3	Gasket Set, Lower	1429672	

# GASKETS CONTINUED

PART #	DESCRIPTION	INTERCHANGE	NOTES (IF APPLICABLE)
CS54214-4	Gasket Set, Lower	1803446	
CS54214-5	Gasket Set, Lower	2144150	
CS54214-6	Gasket Set, Lower	1159462	
CS54214-7	Gasket Set, Lower	1150957	
CS54214-8	Gasket Set, Lower	1248898	
CS54214-9	Gasket Set, Lower	1209328	
CS54214-11	Gasket Set, Lower	1535527	
CS54643-1	Gasket Set, Lower	1905978 / 2572756 / 3211415 + 2401614(24)	Consolidated set, Isolation Pan Gasket
CS54643-2	Gasket Set, Lower	2969949 + 2401614(24)	Isolation Pan Gasket
OS32183	Gasket Set, Oil Pan	4N1151	Paper
OS32300	Gasket Set, Oil Pan	1685248(1) + 2401614(24)	Isolation Pan Gasket
OS32500A	Gasket Set, Oil Pan	4N1151(2)	Paper
MS19417	Gasket Set, Exhaust Manifold	1384611(6)	
MS19528	Exhaust Tube	2818261	One per Cylinder
JV5089	Gasket Set, Front Structure	2341866	
JV5093	Gasket Set, Front Structure	1599600 / 1583155 / 2336984	Consolidated set
JV5104	Gasket Set, Front Structure	2341633	
JV5105	Gasket Set, Front Structure	2341904 / 3211416	Consolidated set
JV5106	Gasket Set, Front Structure	2390998	
JV5107	Gasket Set, Front Structure	2969852	
JV1698	Gasket Set, Rear Structure	2323679	
JV1700	Gasket Set, Rear Structure	2341877 / 3211417	Consolidated set
JV1701	Gasket Set, Rear Structure	2853200 / 1555619 / 2519351	Consolidated set



## ANCILLARY

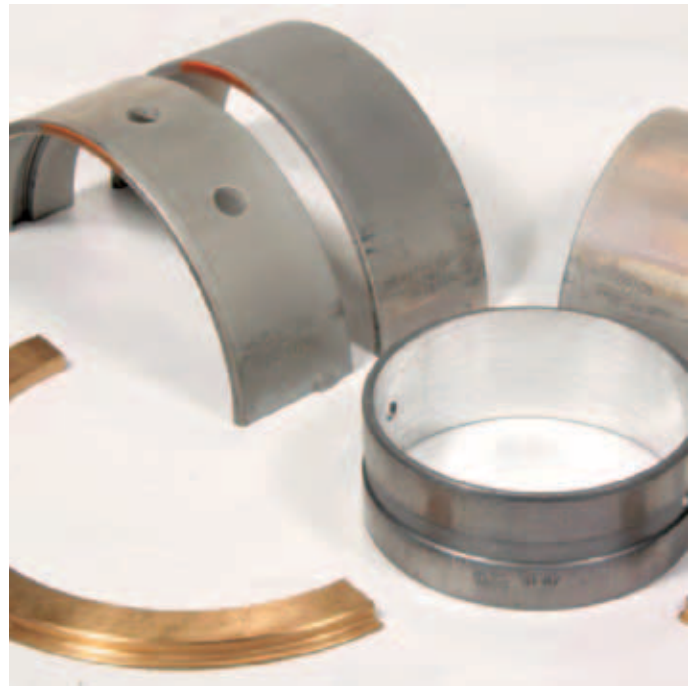
PART #	DESCRIPTION	INTERCHANGE
211-4166	Valve, Intake	1537023
211-4167	Valve, Exhaust	1537024
212-1460	Spring, Valve, Inner	2113122
212-1461	Spring, Valve, Outer	2113123
217-4110	Valve Guide	1227375
247-5146	Crankshaft	611453

**Engine Kits are also available at  
[www.mahlecleviste.com/launchpad](http://www.mahlecleviste.com/launchpad)**

*\*Call for availability.*

# BEARINGS

PART #	DESCRIPTION	INTERCHANGE
CB-1622P	Con. Rod Bearing Set	9Y7735
CB-1622P-25	Con. Rod Bearing Set	7E0558
CB-1622P-50	Con. Rod Bearing Set	7E0559
MB-2848AL	Main Bearing, Individual	4W5492 / 2110592
MB-2848AL-10	Main Bearing, Individual	4W5492 / 1110592(.010")
MB-2848AL-25	Main Bearing, Individual	4W5698
MB-2848AL-50	Main Bearing, Individual	4W5699
MB-3448W	Thrust Washer, Individual	2531752
TW-583S	Thrust Washer Sets	2531752(2)
SH-1979	Camshaft Bearing, Individual	2165582



# CYLINDER COMPONENTS



PART #	DESCRIPTION	INTERCHANGE
226-1969	Sleeve Assembly	1807352 + 1326663 + 1979322
226-1970	Sleeve Assembly	1252837 + 1300241 + 1979322
226-1971	Sleeve Assembly	1495566 + 1300241 + 1979322
226-1972	Sleeve Assembly	2212305 + 1326663 + 1979322
226-1973	Sleeve Assembly	7C2888 + 1300241 + 1979322
226-1994	Crownless Sleeve Assembly	1326663 + 1979322
226-1995	Crownless Sleeve Assembly	1300241 + 1979322
224-3374X	Piston Crown	1807352
224-3375X	Piston Crown	1352837
224-3376X	Piston Crown	1495566
224-3377X	Piston Crown	2212305
224-3378X	Piston Crown	7C2888
224-3397	Crown and Skirt	1807352 + 1326663
224-3398	Crown and Skirt	1352837 + 1300241
224-3399	Crown and Skirt	1495566 + 1300241
224-3400	Crown and Skirt	7C2888 + 1300241
224-3587	Crown and Skirt	2212305 + 1326663
224-3346X	Skirt	1300241
224-3347X	Skirt	1326663
226-4506X	Bare Cylinder Sleeve	1979322
226-4506	Cylinder Sleeve	1979322WS
223-7195	O Ring Kit	1609874
S41890	Ring Set	1343761 + 2P2817 + 7N7078
S41927	Ring Set	1777496 + 1765749 + 1899771
S41943*	Ring Set	1343761 + 1765749 + 1899771
223-1846	Piston Pin	1687246
223-5511	Lock Rings	7E1177



*Driven by performance*

MAHLE Clevite Inc.  
1240 Eisenhower Place  
Ann Arbor, MI 48108  
Phone (800) 338-8786  
Fax (734) 975-7820

Distribution and Customer Service  
7670 Hacks Cross Road  
Olive Branch, MS 38654

Customer Service  
Phone (800) 223-9152  
Fax (877) 853-7541

Tech Line  
Phone (800) 248-9606

Online Ordering  
[www.mahleclevisteorder.com](http://www.mahleclevisteorder.com)

Customer Care Centers  
Charlotte, NC  
Dallas, TX  
Harrisburg, PA (Mechanicsburg, PA)  
Kansas City, KS (Lenexa, KS)  
Los Angeles, CA (Bell, CA)

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

MC-4-209C