



## **IPD Products for Caterpillar® C9 ENGINES**

IPDSteel™ Pistons & Components  
In-Frame Overhaul Kits  
Bearings & Bushings  
Valve Train Components  
Gaskets Sets, Gaskets, & Seals

The Standard for Quality, Innovation, Service and Support Since 1955



# IPD...A SAFE AND SECURE INVESTMENT

Since 1955, IPD has lowered repair costs for industrial engines without sacrificing quality, engine life, or job performance, by providing cost effective, high quality service replacement components. Our robust product line covers a wide range of parts for a variety of diesel and gas engines.

IPD recognizes the importance of repairing engines with quality products. These engines power a variety of machines and equipment (an investment), and are a source of revenue for business, and this is important to IPD. We use only quality materials, and with over 55 years of manufacturing experience, our extensive QC process ensures the IPD products pass our high quality assurance standards before being shipped to customers. Additionally, our comprehensive and clearly stated warranties give our customers true peace of mind when purchasing IPD products because they know they are protected.

IPD is ISO9001:2008 certified by Lloyd's Register®, an organization that is respected worldwide for high standards of technical competence, impartiality and independence. Being ISO9001:2008 certified provides our customers the assurance of IPD's consistent compliance with the ISO controls and processes. The extent to which IPD has developed it's ISO process, and made it a part of virtually every aspect of IPD, is an uncommon practice in most companies within the heavy-duty aftermarket parts industry.

Read more about IPD quality and areas of differentiation at [www.ipdparts.com](http://www.ipdparts.com). Thank you for taking the time to view this document, we appreciate the opportunity to prove to you what truly sets IPD apart from our competition.

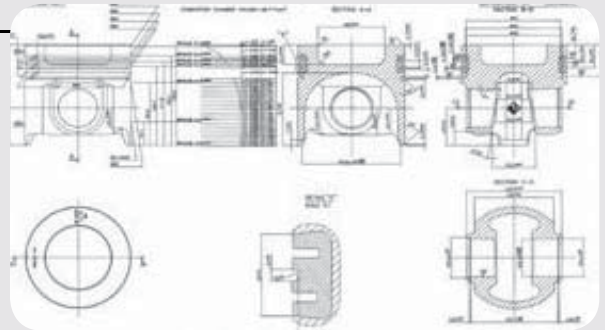


# SUPERIOR QUALITY CONTROL

IPD is known industry-wide for high quality parts and excellent service. Our goal is to create consistent and positive interactions with our distributors and their customers from start to finish, as well as offering reliable support after the sale. This starts by manufacturing IPD brand parts from high quality materials, ensuring that each part has the correct specification and tolerances, and has gone through a rigorous quality control process. Our attention to detail and quality truly makes IPD stand out from our competition. Listed below are just a few examples of how IPD ensures quality control, and takes the necessary steps to produce top of the line products.

## HOW OUR QC PROCESS WORKS

We produce our products from concept to execution. Our process begins with a drawing that ensures the verification of exact specifications and tolerances, as shown in a sample drawing of an inspection of a natural gas application piston.



Quality control of all IPD aluminum diesel and natural gas pistons includes ultrasonic bond and critical dimension checks through the use of CMM and hand measuring equipment.

Cylinder liner dimensional control includes dozens of critical specifications, including inside and outside dimensions, flange specifications, and o-ring groove size checks, which is accomplished through tools such as a CMM, height gauge, hardness testor, and surface analyzer.



Valves, guides, seats and springs are all critical items in heavy duty engines that require extra care. Our valve inspection program includes checking vital measurements such as valve angles, not to mention the critical metallurgies used today.

Shown here is our in-house tangential piston ring tension tester.



# SUPERIOR ENGINEERING INNOVATION

## IPDSTEEL™

Piston technology has evolved significantly due to increased cylinder pressures, performance and emissions requirements. IPD responded with the Patented IPDSteel™ articulated two-piece piston design. This design provides improved overall thermal transfer between the piston crown and cooling system of the engine, resulting in an exclusive design that provides exceptional performance. Materials, specifications, and designs are increasingly critical for proper engine life and performance. Since 2003, IPD has manufactured steel pistons in various designs, and provided product for thousands of engines in many vocations, applications, and markets worldwide.

IPD began in the late 1990's working with world-class casting experts, as well as independent metallurgy specialists, to continue to evolve IPDSteel™ technology, and apply it to various steel piston applications. After the concept and designs were run through a variety of casting industry experts, including independent metallurgical evaluations, IPD subcontracted an independent company specialized in testing cylinder power components, as well as utilizing extensive field testing. As a result, you can expect exceptional performance from IPDSteel™ technology.



How It Works: Utilizing modern casting processes, when controlled properly along with the correct metallurgy and heat treating, offers increased performance over previous designs and methods.

➤ Our Patented process begins with a base metallurgy, which includes 4130 high strength alloy steel to control the carbon content of the material. This steel when heated properly, has high strength qualities, and controls brittleness, assuring our rigid quality standards are adhered to.

➤ Our Patented process continues with a high quality investment casting using the lost wax process. The process is tightly controlled throughout to assure a high integrity casting.

➤ X-ray diagnosis was utilized in the development process to assure casting integrity, and ongoing sampling of castings assures adherence to our rigid quality standards.

# SUPERIOR PERFORMANCE

## VALVE TRAIN

At IPD, our valve train products offer customers a safe and cost effective alternative. Our valve train products are developed from materials specifically designed for heavy-duty industrial applications, and not from automotive grade materials...a common aftermarket industry practice. IPD puts quality as a top priority, which provides our customers the assurance that they are not exposing their equipment to risk that could potentially decrease cylinder head life expectancy. Our valve guides maintain uniformed dimensions, knurling and tight tolerances to achieve maximum valve cooling and oil control, as well as valve springs made from the highest quality steel, correct tensions and shot-penned for strength and long service life.



## IPD GASKET MATERIALS AND TECHNOLOGY



The quality of our materials at IPD defines our gasket program. Many aftermarket gasket manufacturers compromise the quality of their gaskets by using materials not intended to work under the extreme conditions that most diesel and natural gas engines are subject to. These lighter duty materials lead to reduced sealing capability, or in more extreme cases, lower engine performance and engine life.

IPD uses the latest materials, and verifies through a rigorous QC process that each part number receives the correct material specification for the application. Critical tests and measurements are applied to all of IPD's gasket materials to assure that there are no performance issues. Some of these include:

### Creep Relaxation

➤ This indicates the ability of a material to retain its original bolt torque specification after exposure to stress.

### Crush Resistance Density

➤ Crushing or extrusion can occur when compressive forces exceed the point where the gasket materials pore volume is zero, resulting in leakage.

### Tensile Strength

➤ This is a measurement of the materials resistance to blow out when used in high pressure or high torque applications.

# SUPERIOR SOLUTIONS

## IPD GASKET PROGRAM

We realize that demands can differ between markets or applications, so we offer two distinct gasket systems:

### Modular "Original Style" Multiple Sets

These sets are based on the same multiple groups that you might be accustomed to from the OEM. They are specific to an engine arrangement, or a close grouping of arrangements, and serial numbers. Many times when ordering the Modular Original Style multiple sets, you must order multiple part numbers (possibly up to 8 or 9 sets, or more) to rebuild your engine, since they might not include items that are commonly replaced or needed to reinstall a component. IPD offers a unique and custom gasket set to alleviate these issues.

### IPDStyle 123™ Consolidated Sets



For years, IPD customers complained of the difficulty of ordering, shipping, & maintaining inventory of original style multiple sets. In the late 1980's, IPD developed and customized our special sets to:

- Reduce IPD distributor's and rebuilder's inventory by consolidating a wider range of serial and arrangements than was possible with the original style multiple sets.
- Reduce the time to order and stock many different multiple style sets in order to cover a wider range of equipment and engines.
- Packaging IPDStyle 123™ with individual groupings based on the engine component, or the location of the gaskets on the engines, in easy to identify bags.
- Marking all gaskets and o-rings clearly with the part numbers for easy identification, reducing engine technician's time to find the proper part.
- IPDStyle 123™ sets are designed from the ground up with help from our customers that rebuild these engines. Do not confuse these with other companies that simply put all the multiple sets into one box, and call it consolidated, as they offer lack critical items or duplicating pieces.

## PARTS LIST FOR IPD C9 ENGINE SERIES PRODUCTS\*

Item Description	Part Number	Notes
<b>IN-FRAME KITS</b>		
IN-FRAME KIT IPD STEEL PISTON	IF2701/002	FOR ON-HIGHWAY APPLICATIONS USING PISTON #2382701 & ENGINE S/N 9DG
IN-FRAME KIT IPD STEEL PISTON	IF9345/002	FOR ON-HIGHWAY APPLICATIONS USING PISTON #1979345 & ENGINE S/N 9DG
<b>CYLINDER COMPONENTS</b>		
CYLINDER KIT IPDSTEEL PISTON	PLG1979297	POPULAR INDUSTRIAL & MACHINE APPLICATIONS
CYLINDER KIT IPDSTEEL PISTON	PLG1979345	ON-HIGHWAY ENGINES WITH S/N 9DG & MTB
CYLINDER KIT IPDSTEEL PISTON	PLG2382701	INDUSTRIAL & ON-HIGHWAY ENGINE WITH S/N 9DG, CKP, MTB, SRB, THY, & THX
CYLINDER KIT IPDSTEEL PISTON	PLG2651401	INDUSTRIAL ENGINES WITH S/N THY & THX
CYLINDER LINER	1903562	
LINER O RING	1670024	1 PER LINER
PISTON PIN	1663648	
PISTON RING, INTERMEDIATE	1613424	USED IN C9RS1 RING SET
PISTON RING, INTERMEDIATE	1613425	USED IN C9RS2 RING SET
PISTON RING, OIL CONTROL	1687209	USED IN C9RS2 RING SET
PISTON RING, OIL CONTROL	1687211	USED IN C9RS1 RING SET
PISTON RING, TOP	1979299	USED IN C9RS2 RING SET
PISTON RING, TOP	1979392	USED IN C9RS1 RING SET
PISTON SKIRT	3247380	
RETAINER, PISTON PIN	7X2908	
RING SET	C9RS1	USED WITH 2382701, 1979345, 2651401 PISTON CROWNS
RING SET	C9RS2	USED WITH 1979297 PISTON CROWNS
<b>VALVE TRAIN COMPONENTS</b>		
SEAT, VALVE	1767688	
SEAT, VALVE	1767690	
INSERT, VALVE SEAT EXHAUST	2128918	
INSERT, VALVE SEAT INTAKE	2128917	
INSERT, VALVE SEAT INTAKE	2418388	
SEAT, VALVE SPRING	1837889	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SEAT, VALVE SPRING	2170609	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SEAT, VALVE SPRING	2418387	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SPRING, VALVE INNER	1906115	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SPRING, VALVE INNER	2418386	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SPRING, VALVE OUTER	1906117	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SPRING, VALVE OUTER	2418385	REFER TO ENGINE S/N & ARRANGEMENT NUMBERS FOR CORRECT APPLICATIONS
SEAL, VALVE STEM	2418390	
SEAL, VALVE COVER BASE	2683490	

\* Parts listing (subject to change) provided for reference purposes only, not to be used as a catalog.

## PARTS LIST FOR IPD C9 ENGINE SERIES PRODUCTS\*

Item Description	Part Number	Notes
<b>BEARINGS &amp; BUSHINGS</b>		
BUSHING, PIN	1608194	
CAM BUSHING	2035805	INTERMEDIATE BUSHING, 2 PER ENGINE
CAM BUSHING	2036090	REAR BUSHING, 1 PER ENGINE
CAM BUSHING	2165586	FRONT, 1 PER ENGINE (PREVIOUSLY ANNOUNCED)
THRUST PLATE	2463150	2 PER ENGINE
CON ROD BEARING STD	2133190	6 PER ENGINE
CON ROD BEARING 0.25MM	2822478	
MAIN BEARING STD	1512939	7 PER ENGINE
MAIN BEARING 0.25MM	2821771	
MAIN BEARING STD	3314184	TRI-METAL BEARING FOR EXTREME APPLICATIONS. ENGINE S/N CLJ, JSC, & MBD. 7 PER ENGINE
<b>GASKET SETS</b>		
CYLINDER HEAD REPLACEMENT SET	C90003	ON-HIGHWAY ENGINES WITH S/N 9DG
CYLINDER HEAD REPLACEMENT SET	C90013	SELECT D6R MACHINE APPLICATIONS WITH ENGINE S/N SAN & 4ZF
CYLINDER HEAD REPLACEMENT SET	C90023	SELECT 330C MACHINE APPLICATIONS WITH ENGINE S/N SAN & 4ZF
CYLINDER HEAD REPLACEMENT SET	C90033	SELECT D6R MACHINE APPLICATIONS WITH ENGINE S/N THY & THX
CYLINDER HEAD REPLACEMENT SET	C90043	SELECT 330D MACHINE APPLICATIONS WITH ENGINE S/N THY & THX
CYLINDER HEAD REPLACEMENT SET	C90053	SELECT 330C & 330D MACHINE APPLICATIONS WITH ENGINE S/N 4ZF & THY
CYLINDER HEAD REPLACEMENT SET	C90063	SELECT 330D & 330DL MACHINE APPLICATIONS WITH ENGINE S/N THX
IN-FRAME OVERHAUL SET	C90002NLS	ON-HIGHWAY ENGINES WITH S/N 9DG
IN-FRAME OVERHAUL SET	C90012NLS	SELECT D6R MACHINE APPLICATIONS WITH ENGINE S/N SAN & 4ZF
IN-FRAME OVERHAUL SET	C90022NLS	SELECT 330C MACHINE APPLICATIONS WITH ENGINE S/N SAN & 4ZF
IN-FRAME OVERHAUL SET	C90032NLS	SELECT D6R MACHINE APPLICATIONS WITH ENGINE S/N THY & THX
IN-FRAME OVERHAUL SET	C90042NLS	SELECT 330D MACHINE APPLICATIONS WITH ENGINE S/N THY & THX
IN-FRAME OVERHAUL SET	C90052NLS	SELECT 330C & 330D MACHINE APPLICATIONS WITH ENGINE S/N 4ZF & THY
IN-FRAME OVERHAUL SET	C90062NLS	SELECT 330D & 330DL MACHINE APPLICATIONS WITH ENGINE S/N THX

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## PARTS LIST FOR IPD C9 ENGINE SERIES PRODUCTS\*

Item Description	Part Number	Notes
<b>GASKETS</b>		
GASKET	1613411	
GASKET	1914457	
GASKET	1950452	
GASKET	2192340	
GASKET	2732727	
GASKET	2834433	
GASKET	2850365	
GASKET	2912158	
GASKET, CYLINDER HEAD	1871315	
GASKET, OIL PAN	1906114	
GASKET, OIL PAN	1931167	
<b>SEALS</b>		
SEAL	1240506	
SEAL	2175701	
SEAL	2634016	
SEAL	2730302	
SEAL	2854106	
SEAL, O RING	336032	
SEAL, O RING	5P6436	
SEAL, O RING	1214344	
SEAL, O RING	1534906	
SEAL, O RING	1600526	
SEAL, O RING	1832317	
SEAL, O RING	1899377	
SEAL, O RING	2147567	
SEAL, O RING	2213494	
SEAL, O RING	2287089	
SEAL, O RING	2287096	
SEAL, O RING	2385080	
SEAL, O RING	2594598	
SEAL, O RING	3107255	
SEAL, O RING	3107257	
SEAL, O RING	3107259	
SEAL, O-RING	3107258	

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# IPD C9 PRODUCT LINE

IPD provides cost effective quality without risk to engine life or performance. Listed below are a few product highlights of the IPD C9 series product line.

## IPDSteel™ Pistons

IPDSteel™ articulated two piece piston crowns for C9 engines are manufactured with a Patented heat treated steel casting for high strength, durability, heat and wear resistance, and dimensionally stability under conditions of high heat and pressure. The finished design provides excellent overall thermal transfer between the piston crown and cooling system of the engine for exceptional performance.

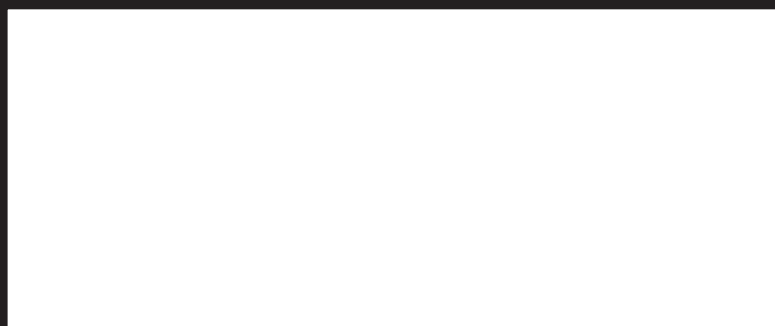
## Main and Rod Bearings

IPD main and rod bearings for “extreme” C9 engine applications feature a bi-metal design with a copper/lead alloy and steel for strength, durability, and performance. In addition to fatigue strength, this design provides resistance against wear, seizure, corrosion, and cavitation, and also imparts excellent conformability and embedability.

## Gaskets and Gasket Kits

IPD uses premium materials designed for heavy duty industrial engine applications. Rocker cover base seals are made of molded rubber with metal inserts. And, for selected applications, composite type oil pan seals come with integrated metal inserts.

## IPD brand quality products distributed by:



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## Piston Pin

IPD piston pins are manufactured from a hardened chromium, molybdenum, and nickel alloy steel to produce excellent tensile strength and wear resistance.

## Cylinder Liners

IPD cylinder liners are induction hardened for improved wear resistance and strength.

## Valve Train Components (available August 2011)

For C9 engines, the intake valve heads are made of a chrome-nickel alloy, which provide excellent high temperature strength, hardness and corrosion resistance. This high quality, heat-treated material includes Stellite™ facing, a corrosion and wear resistant cobalt-chromium alloy. The intake valve stems are made of a high chromium alloy that provides excellent corrosion resistance, and resistance to stress corrosion cracking. The exhaust valves are made of a special high performance nickel-chromium “super alloy” that is designed for very high temperature strength (in the 1,600°F range), while providing excellent corrosion resistance. The exhaust valve stems feature chromium, molybdenum, & manganese low-alloy type steel designed for torsional and fatigue strength, and durability.

## IPD

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