



IPD Products for **CATERPILLAR®** **3406 / 3408 / 3412 & C15 ENGINES**



*Pictured, a typical 3406E
IPD in-frame overhaul
kit utilizing our patent
pending IPDSteel® cast
articulated pistons.*

In this bulletin, we hope you will find enough information to give you confidence that the total value of the IPD package is worthy of your consideration. IPD has offered quality, innovation, service and support since 1955, and we are confident that

we can help lower your overhaul costs. If you would like more information on other IPD products or on our company in general, please visit our web site at www.ipdparts.com

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CERTIFIED BY
LLOYD'S REGISTER



INNOVATION...NOT JUST IMITATION!

Most aftermarket companies are content with only offering "copycat" parts by attempting to duplicate the look of the original. IPD has taken the position since its inception to not only offer products that will perform as well as the original, but also to work with our customers world-wide to find ways to improve engine performance or engine life. This can result in greater savings in long-term cost per hour for engine owners. A few examples of IPD innovations are shown below specific to the IPD product range for 3406 / 3408 / 3412 & C15 applications:

IPDSteel® ARTICULATED PISTONS



For years, engine rebuilders and engine owners have been forced to deal with only one source on newer applications utilizing articulated, steel crown/aluminum skirt two-piece pistons. After years of development and testing, IPD has introduced the **IPDSteel®** articulated cast steel pistons for applications such as the Caterpillar® 3400 & C15 series.

Our patent pending design and processes include:

- ◆ High quality casting techniques for product integrity
- ◆ High strength 4130 alloy steel
- ◆ Heat treatment for strength
- ◆ Latest in equipment & machining techniques
- ◆ Quality control features that include:
 - X-ray to ensure the quality of what you can not see
 - Testing of bushing retention
 - Dimensional quality control

All parts are covered by our aftermarket leading Technical and Warranty Support programs. Please contact your IPD Customer Service Center for exact applications.

GROOVED CONNECTING ROD BEARINGS



In 1993, IPD developed the "**GROOVED**" connecting rod bearing for 3400B, C & eventually the E series engines. Some of these engines were known for low hour failure or costly preventative maintenance bearing roll-ins. Shown above are results in the same engine after 300,000 miles with 2 non-grooved bearings shown on left and the IPD grooved bearing shown on right.

IPD GASKET OPTIONS

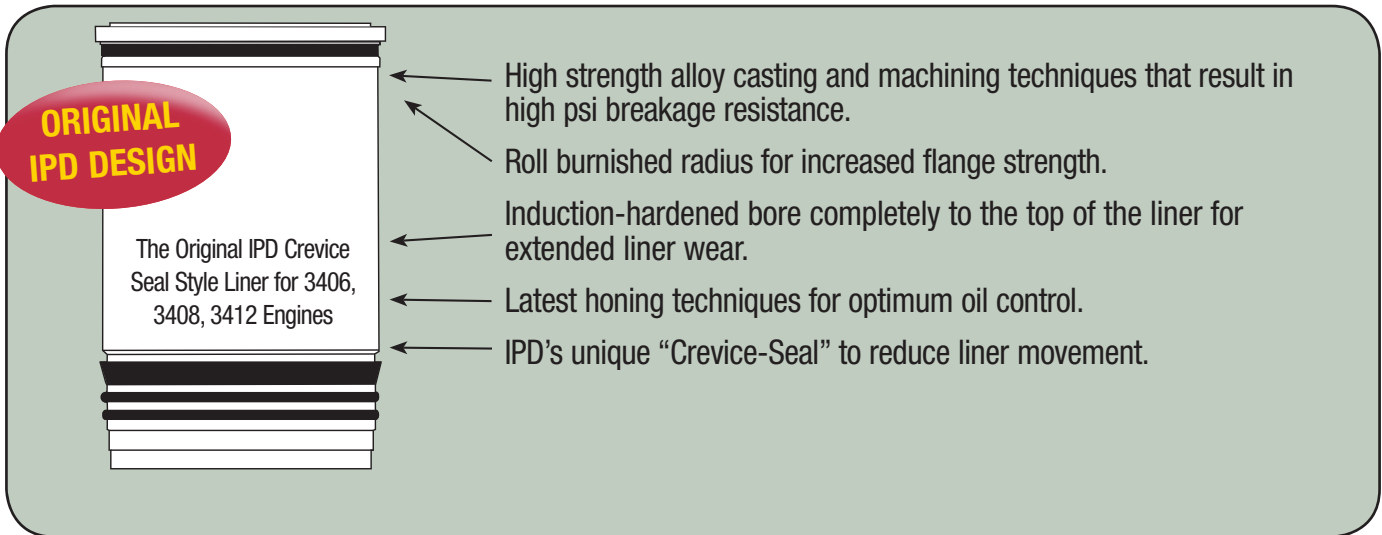
IPD offers both the "OEM Modular style" gasket sets as well as our innovative **IPD 123™** style gasket sets. These sets can reduce your time in determining what sets to use, as well as mechanic's time searching for parts. Compare our gasket and seal materials to our competitors and you will see why these sets are instant hits with quality-conscious engine technicians.



IPD CREVICE SEAL CYLINDER LINER

Approximately 7 liner and o-ring changes for 3400 series Caterpillar® engines between 1982 and 1998 led IPD and our customers to work on ways to extend the life of the bottom o-rings on these engines. Our suspicion was that the o-ring failures in most cases were due to excessive liner movement. Thus the IPD “Crevice-Seal” style cylinder liner was

developed to help reduce that movement by utilizing the tapered crevice seal. This has been sold successfully by IPD for over a decade. Don't be fooled by imitations! Only the IPD 'CS' liner offers all the features mentioned below and is backed by our comprehensive IPD warranty. Please see our written warranty at www.ipdparts.com



IPD PACKAGING

Even our packaging is innovative. For example, IPD cylinder liners are put through an ultra-sonic cleaning system before packaging to assure the best possible cleanliness before you receive them. We also bag the liner, cover the top and bottom of each liner with an IPD plastic cap to keep the dirt out and protect liner surfaces. Each liner is then packed in a high grade box.

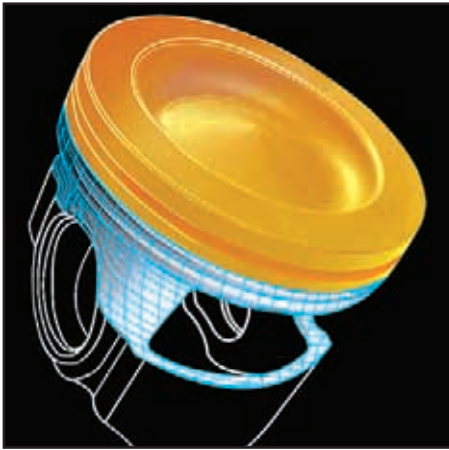
IPD valves are packaged in the most popular engine configurations, separated by cardboard dividers to eliminate nicks and scrapes, and then packaged in top-opening boxes and shrink-wrapped for added protection.

Our engine bearings are typically shrink-wrapped with plastic dividers to eliminate bearing to bearing contact and packed into high grade boxes.

IPD 123™ style gasket sets are sub-packaged in plastic bags and separated by major engine sections (front, top, rear etc) then placed into top-opening boxes and shrink-wrapped for added protection and increased shelf life.



IPD COVERAGE FOR 3406 / 3408 / 3412 "HEUI" APPLICATIONS EXPANDING QUICKLY



Product development at IPD moves forward with many new items for the HEUI (hydraulic electronic unit injector) applications. Available now from IPD are popular wear items such as:

- ◆ IPD 123™ style or modular style gasket sets for many HEUI applications
- ◆ Engine bearings and bushings
- ◆ Valve train components
- ◆ Water and oil pump components
- ◆ Soon to be released IPDSteel®, one-piece steel pistons from IPD!

NATURAL GAS AND METHANE APPLICATIONS FOR G3406 / G3408 / G3412 ENGINES

IPD offers extensive coverage of these popular engines. The parts are produced from materials intended for these critical applications. Some companies may offer products that *fit* these engines, but only IPD's years of experience can provide you with the consistent quality and life expectancy you need. Our experience in over 50 years of manufacturing and supplying of these products is based on our long-time relationships with some of the best natural gas engine rebuilding specialists worldwide.

Whether your company provides drilling, well servicing, natural gas compression, power generation, production or pipeline transmission, IPD supplies quality parts to provide performance and reliability for your specific application.

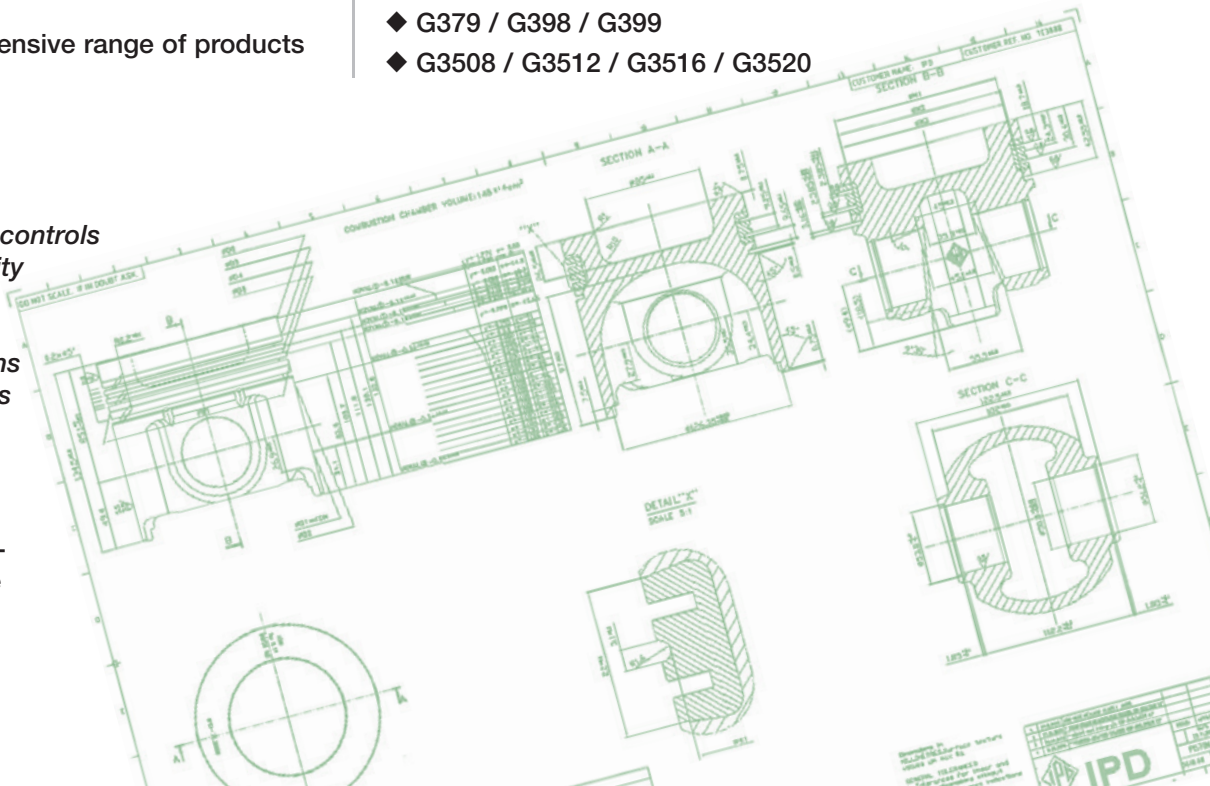
IPD also supplies an extensive range of products

for these other Caterpillar® natural gas and methane applications as well:

- ◆ G3304 / G3306
- ◆ G342
- ◆ G379 / G398 / G399
- ◆ G3508 / G3512 / G3516 / G3520

IPD designs, engineers, controls manufacturing and quality assurance on critical products for natural gas and methane applications such as the G3400 series piston shown in our drawing to the right.

Our product line continuously expands so please check with us often for new availability.



IPD VALVE TRAIN PRODUCTS OFFER THE HIGHEST QUALITY STANDARDS FOR DIESEL AND NATURAL GAS APPLICATIONS

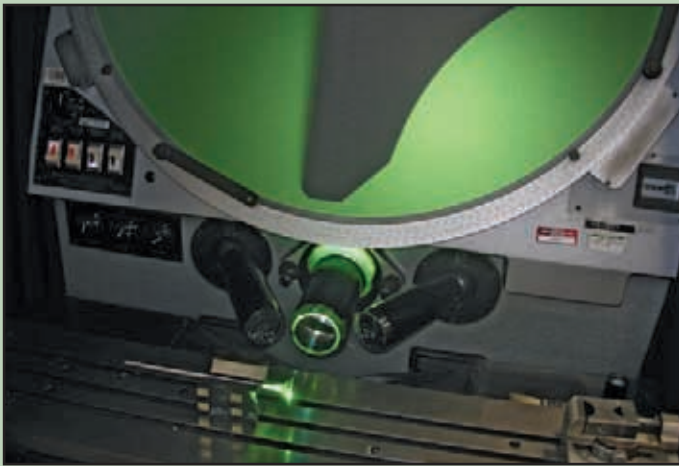
IPD valve train products offer cost savings without risk to cylinder head life expectancy. Our valves are engineered from the materials specifically developed for diesel or natural gas applications, not automotive grade materials

as many aftermarket companies offer in lower priced products. Valve guides, seats, keepers and springs all receive the same attention to detail in specifications and metallurgy.

Listed below are typical specification areas that we address in order to achieve the highest quality standards for IPD valve train products:

- ◆ Exhaust valves made of 23-8N materials, not automotive or light duty materials
- ◆ Valve seats utilizing purpose built materials specific to applications such as natural gas, diesel or methane

- ◆ Valve guides with uniform dimensions, knurling and tight tolerances for maximum valve cooling and oil control
- ◆ Valve springs of the highest quality steel with correct tensions and shot-penned for strength and long service life



IPD valve inspected on our optical comparator.



Typical parts coverage for a 3406E engine.

IN & OUT OF FRAME ENGINE OVERHAUL KITS FROM IPD FOR POPULAR ON-HIGHWAY 3406A,B,C,E & C15 APPLICATIONS

We offer cost saving kits for popular applications with our in and out-of-frame overhaul kits. These kits will typically contain:

- ◆ Pistons, pins and retainers (aluminum, gallery-cooled aluminum, two-piece articulated)
- ◆ Cylinder liners, o-rings and seals with optional IPD "crevice seal" style liner
- ◆ Rings made of the latest material, coatings and quality assured for size, tension and finish
- ◆ Rod & main bearings with optional IPD *grooved* connecting rod bearing
- ◆ IPD 123™ style gasket sets for simplifying your ordering and assembly

Only IPD offers engine overhaul kits with the unique patent pending IPDSteel® two-piece cast series of articulated pistons.

Options available by visiting our on-line IPDNet™ or by contacting your IPD Customer Service Center for details.

WHAT PISTON IS IN YOUR ENGINE?

In some cases, pistons may have been upgraded or changed from what was originally installed at the factory. To help determine what piston you have in your **Caterpillar® 3406, 3408, 3412 or the later “C-liter” series 5.4” (137.16mm) bore engines**, we have put together the following pictures, descriptions, and assigned our own "type"

Continued on next page



TYPE 1

One-piece aluminum piston.
IPD offers coverage for most applications.

Generally fits A, B and early C engines.

TYPE 2

One-piece aluminum piston with crown gallery cooling.
IPD offers coverage for most applications.

Generally fits C & some early E engines.

TYPE 3

Two-piece articulated piston with steel crown and aluminum skirt.
This version has open crown gallery.
IPD offers the **IPDSteel®** cast steel series for most popular applications.

Generally fits late C & early E & C15 engines.



New Piston manufacturing equipment installed at IPD-Torrance headquarters to produce IPDSteel® pistons.

In 2006 IPD installed a state of the art purpose built Piston - CNC machine at our Torrance California manufacturing facility.

This new equipment gives us the ability to continue our manufactur-

ing evolution to newer technology pistons.

Applications include our latest articulated cast IPDSteel® pistons for 3116 / 3126 / 3400E and C15 engines and ultimately our IPDSteel® one piece steel pistons.

number designations to help you identify them. These piston types are also referenced on the **IPD ON HIGHWAY QUICK REFERENCE GUIDE** that follows in this publication. As always, refer to the engine serial and arrangement numbers, and consult the OEM part reference or contact your IPD Customer Service Center for exact applications.



TYPE 4

Two-piece articulated piston with steel crown and aluminum skirt. This version has **closed** crown gallery. IPD offers the IPDSteel® cast steel series for most popular applications.

Generally fits later E & C15 engines.

TYPE 5

One-piece steel piston. IPD will offer the IPDSteel® cast steel series soon.

Generally fits latest E & C15 engines as well as late 3408 / 3412 configuration "HEUI" applications.

IPD's purpose built cylinder liner facility continues to grow and produce the highest quality induction-hardened cylinder liners.



Since it's opening in 2006 our cylinder liner factory continues to not only strive for continual improvement but also adds new products to our extensive line of IPD Products. The latest addition is the induction-hardened cylinder liner for the IPD C12 engine program.

IPD IN-FRAME OVERHAUL KITS FOR 3406 & C15 CATERPILLAR® TRUCK ENGINES

GENERAL COMMENTS OR QUESTIONS TO ASK

- 1) Serial Number and Arrangement Number are **needed for accurate parts ordering**.
- 2) Ask if customer has piston number off top of crown? **Only for reference** - does not imply it is proper piston!
- 3) What size rod and main bearings? (ie: Standard, Oversize) **Note IPD Conn. Rod Bearings are grooved for cavitation resistance.**
- 4) Would you like to try our Original IPD Crevice Seal Style Liner "CS" for added assurance against liner movement and O-ring deterioration?
- 5) **Out of Frame Kits are available** also from IPD - Please contact your IPD Customer Service Representative.
- 6) All IPD IF and OF kits come with our original **IPD Style™ 123 Gasket Sets** for **ALL** the parts you need for either in or out of frame overhaul!

Please refer to previous page, article titled "What piston is in your engine? For description of piston "types"

3406A, B & C APPLICATIONS

3406 A-B-C INFRAME KITS	DESCRIPTION	PISTON NUMBER	Engine Series	Piston Type	C/R	COMMENTS	NOTES
IF4004/32	IN FRAME OVERHAUL KIT	9Y4004	"A"	1	14.5:1	JWAC	92U5944- Up
IF4004/32/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF4004/52	IN FRAME OVERHAUL KIT	9Y4004	"A-B"	1	14.5:1	JWAC	7FB & 4MG EARLY A-B
IF4004/52/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF4004/62	IN FRAME OVERHAUL KIT	9Y4004	"B"	1	14.5:1	ATAAC	7FB & 4MG
IF4004/62/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF9889/52	IN FRAME OVERHAUL KIT	9Y9889	"B"	1	15.2:1	JWAC	4MG & 8TC
IF9889/52/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF9889/62	IN FRAME OVERHAUL KIT	9Y9889	"B"	1	15.2:1	ATAAC	4MG & 8TC
IF9889/62/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF7212/52	IN FRAME OVERHAUL KIT	9Y7212	"B"	1	15.6:1	JWAC	4MG & 8TC
IF7212/52/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF7212/62	IN FRAME OVERHAUL KIT	9Y7212	"B"	1	15.6:1	ATAAC	4MG & 8TC
IF7212/62/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF8656M/112	IN FRAME OVERHAUL KIT	7E8656	"C"	1	15.6:1	ATAAC	3ZJ & 4CK
IF8656M/112/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF0016M/112	IN FRAME OVERHAUL KIT	1010016	"C"	1	16.4:1	ATAAC	3ZJ
IF0016M/112/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF0292M/112	IN FRAME OVERHAUL KIT	7E0292	"C"	1	15.6:1	ATAAC	3ZJ & 4CK
IF0292M/112/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF5063M/272	IN FRAME OVERHAUL KIT	1175063	"C"	1	16.0:1	ATAAC	8PN
IF5063M/272/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF0539M/62	IN FRAME OVERHAUL KIT	7E0539	"C"	1	15.2:1	ATAAC	"4MG, 3ZJ & 8TC"
IF0539M/62/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF8700M/112	IN FRAME OVERHAUL KIT	7E8700	"C"	1	15.2:1	ATAAC	3ZJ & 4CK
IF8700M/112/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF1131/112	IN FRAME OVERHAUL KIT	1601131	"C"	2	14.5:1	ATAAC	4CK
IF1131/112/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"

3406E APPLICATIONS

3406E INFRAME KITS	DESCRIPTION	PISTON NUMBER	Engine Series	Piston Type	C/R	COMMENTS	NOTES
IF2716M/462	IN FRAME OVERHAUL KIT	1082716M	"E"	1		ATAAC	5EK & 6TS
IF2716M/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF2837/462	IN FRAME OVERHAUL KIT IPDSteel®	1352837	"E"	3	16.25:1	Skirts <u>and</u> Crowns included	5EK & 6TS
IF2837/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF5566/462	IN FRAME OVERHAUL KIT IPDSteel®	1495566	"E"	3	16.25:1	Skirts <u>and</u> Crowns included	5EK & 6TS
IF5566/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF2888/462	IN FRAME OVERHAUL KIT IPDSteel®	7C2888	"E"	3	16.25:1	Skirts <u>and</u> Crowns included	5EK & 6TS
IF2888/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF7352/462	IN FRAME OVERHAUL KIT IPDSteel®	1807352	"E"	4	16.6:1	Skirts <u>and</u> Crowns included	1LW & 2WS
IF7352/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"

3406E "CROWN-LESS" OVERHAUL KITS

3406E INFRAME KITS	DESCRIPTION	PISTON NUMBER	Engine Series	Piston Type	C/R	COMMENTS	NOTES
IF0241/462	CROWN-LESS IN FRAME OVERHAUL KIT	1300241 Piston SKIRT	"E"	3		<u>Skirts included</u>	5EK & 6TS
IF0241/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
CROWNS (1352837 / 7C2888 / 1495566) ARE COMPATIBLE WITH OUR 1300241 PISTON SKIRT		<i>Crowns available in kits listed above</i>					
IF6663/462	CROWN-LESS IN FRAME OVERHAUL KIT	1326663 Piston	"E"	4		<u>Skirts included</u>	5EK & 6TS
IF6663/462/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
CROWN (1807352) IS COMPATIBLE WITH 1326663 PISTON SKIRT		<i>Crowns available in kits listed above</i>					

C15 OVERHAUL KITS

C15 INFRAME KITS	DESCRIPTION	PISTON NUMBER	Engine Series	Piston Type	C/R	COMMENTS	NOTES
IF7351/002	IN FRAME OVERHAUL KIT IPDSteel®	1807351	C15	4	18.1:1	Skirts and Crowns Included	6NZ
IF7351/002/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"
IF7352/002	IN FRAME OVERHAUL KIT	1010016	C15	4	16.6:1	Skirts and Crowns Included	6NZ & 9NZ
IF7352/002/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"

C15 "CROWN-LESS" OVERHAUL KITS

C15 INFRAME KITS	DESCRIPTION	PISTON NUMBER	Engine Series	Piston Type	C/R	COMMENTS	NOTES
IF6663/002	CROWN-LESS IN FRAME OVERHAUL KIT	1326663 Piston SKIRT	C15	4		<u>Skirts included</u>	6NZ & 9NZ
IF6663/002/CS	IN FRAME OVERHAUL KIT w/CS LINER	"	"	"	"	"	"

CROWNS (1807351 & 1807352) ARE COMPATIBLE WITH OUR **1326663 PISTON SKIRT**. (*Crowns available in kits listed above*)
NOTE: IPD C-15 KITS DO NOT INCLUDE THE 1685248 ISOLATION SEAL FOR THE UNDERFRAME STIFFENER PLATE WHERE APPLICABLE

This publication is intended as a quick reference guide only and not to be used as a full catalog. Please consult **IPDNet™** or contact your IPD Customer Service Representative for more information. Correct Serial and Arrangement numbers are required for specific cataloging.

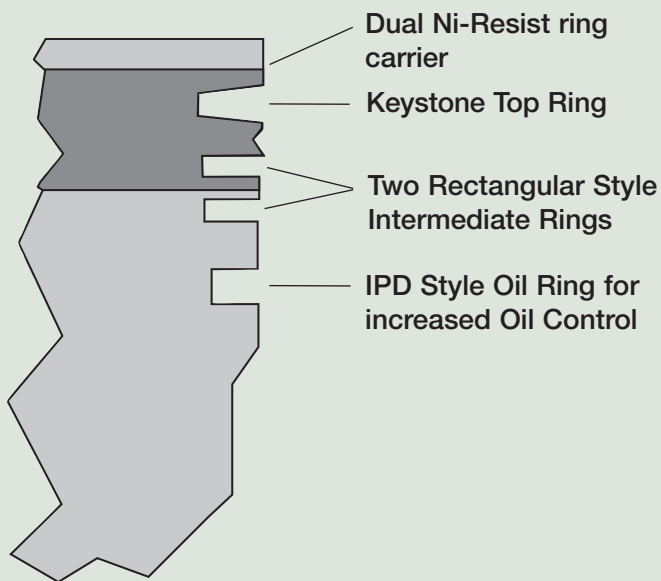
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 All manufacturers' names, numbers, symbols and descriptions are for reference only. It is not implied that any part is the product of the manufacturer.
 Caterpillar® and Cat® are registered trademarks of Caterpillar, Inc.

PRODUCT COVERAGE AND OPTIONS FOR CATERPILLAR® 3406 / 3408 / 3412

Coverage and options so that you can determine how most efficiently to overhaul your engine. On the enclosed **Quick Reference Guide**, you will see some of these choices which can include (depending on engine application):

- ◆ In-frame overhaul kits for 3406 & C15
 - ◆ Out-of-frame overhaul kits for 3406 & C15
 - ◆ Crown-less kits (where articulated crowns can be re-used)
 - ◆ IPDSteel® articulated 2-piece in & out of frame engine overhaul kits
 - ◆ PLG (piston & liner group or cylinder kit)
 - ◆ Individual parts as opposed to above kits
 - ◆ NEW Turbocharger Cartridges
- ◆ Gasket sets:
 - IPD Style 123™ conveniently packaged overhaul sets
 - Modular – OEM style gasket sets
 - ◆ New crankshafts
 - ◆ New camshafts & high quality cam followers
 - ◆ Water and oil pump parts
 - ◆ Complete valve train parts
 - ◆ Miscellaneous engine bearings
 - ◆ Many miscellaneous parts such as exhaust stud kits and fuel parts

IPD Exclusive “4-Ring” Option for Light Load Applications



An example of IPD options is our exclusive "4-RING" 3400 series piston that can reduce crankcase blow-by, exhaust smoke, exhaust slobbering and carbon build-up on pistons used in light load applications or have experienced excessive idle time. The IPD 4-RING 3400 series piston option utilizes a keystone style top compression ring but rectangular style 2nd & 3rd compression rings. By using two rectangular

style compression rings, the IPD 4-RING 3400 series piston can control piston blow-by and engine oil consumption better than other designs at times of light or no engine loads. The 4-RING 3400 series is not recommended for on-highway truck applications.

IPD part number 34156MR4 can be used to replace 9Y7212 in certain applications where blow-by is a concern.

AND C15 APPLICATIONS FROM IPD



Camshaft and connecting rod bushings, including oversized camshaft bushings for popular applications.



Exhaust manifold stud kits that include nuts and studs, packaged in convenient kits specific to 3406 engines. Individual parts available for 3408 & 3412 applications.



Water pump rebuild kits for popular applications.

This is only a representation of our coverage; please contact your Customer Service Representative for further details. If you are an IPD Authorized Distributor, you can also access our on-line **IPDNet™** for up to date applications available from IPD.



Available from IPD are popular options such as cylinder kits, in-frame and out-of-frame overhaul engine kits. (Shown with **IPDSteel®** articulated piston)



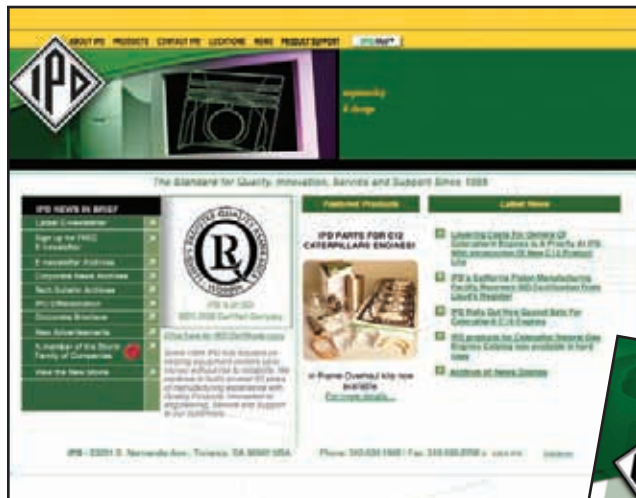
IPD offers a wide range of high quality **forged** steel crankshafts that receive multiple quality control checks for hardness, fillet radius specifications and straightness.



Camshafts and cam followers for popular applications. All held to the closest specifications and tolerances. More camshafts under development.

WEB PAGE OFFERS VIDEO, E-NEWSLETTER, NEW PRODUCT UPDATES AND PRODUCT BULLETINS FROM IPD

Our web page at www.ipdparts.com is constantly changing and updating to provide our customers world-wide with the most recent information possible on IPD and IPD products. Some of the features you will find on our web site include:



- ◆ View and sign up to receive our monthly e-newsletter.
- ◆ Take a look at all IPD's recent magazine ads.
- ◆ View our new short intro video.
- ◆ Go to the NEWS page and view all previous newsletters and technical bulletins.
- ◆ Download our latest IPD Corporate brochures as well as all of our product bulletins.
- ◆ View listings of new products introduced monthly through each e-newsletter.



- ◆ Authorized Distributors can sign up for our exclusive **IPDNet™** on-line catalog and e-commerce system.

- ◆ Link to the Storm Family of Companies web page for more information on our parent company.

IPD brand quality products distributed by:



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