

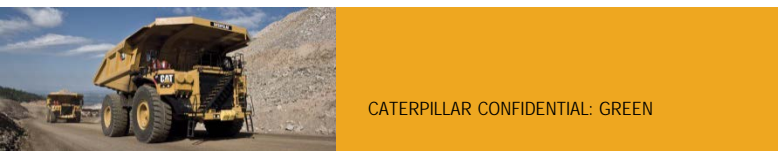


SCOTE Hardware Updates July 21, 2015

Hind Abi-Akar
Mark Jarrett
Vincent Caliendo

Agenda

- 1K/1N parts
 - Water pump
 - Heat exchanger
 - Oil pump
 - Rocker arm shaft, Bracket, Rocker Arm, Crank shaft, bracket-oil filter
- 1P/1R
 - Liners
 - Crank shaft
- Aeration test
 - Gaskets
- Other issues



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1K/1N Water Pump, 04/22/2015, 05/21/2015, 6/30/2015

- MP Pumps (Cat preferred pump supplier) identified electric motor driven pump replacement.
 - **Cat recommended:** MP Part number: 30885, CF1PMP SS 3-3 56C 6.0 T-2100, stainless steel pump, 3hp e phase; 230/460 VAC motor
 - 1Y0633, Pulley- **labs can make this part** (machine shops) for replacement if current pump needs to be supported
 - **Print:** Cat is preparing a print for this part to be shared with the labs that will continue the use of the current pump:
 - Key dimensions; information letters on TMC
 - Procedure will call the “water pump part number or equivalent”
 - **Proposed resolution:** Labs to order pump directly from the supplier
 - Modify procedure to reflect the new pump as an optional replacement as long as the labs meet the specifications (specify the parameters)
 - Fluid flow parameters:

6/30/2015

Any replacement has to provide the set outputs.

How is flow rate controlled: variable speed or set flow rate

Bypass may be setup, should be consistent among labs.

65 l/min +/- 2 ; T delta: 5 deg C +/- 1 deg C; P 50 kPa; water out T:
93 +/-2.5 deg C.

7/21/2015

Pulley: 1Y0633. Part drawing ready for release to TMC. Labs are to machine per the part details.

Water pump parts

1Y0456	PUMP A
1Y0509	PUMP GROUP
1Y0461	IMPELLER
1Y0459	SHAFT
1Y0633	PULLEY



1K/1N Coolant Heat Exchanger, 4/22/2014, 6/30/2015

- Current heat exchanger core is Modine 7B-5946. This part and other supporting parts are no longer available.
- **Next Steps:** Options (details on next slide):
 - 1- The labs can identify a replacement (shell and tube or other) that provides the same parameters.
 - 2- Modine identified full replacement: Heat exchanger can be ordered directly from the supplier
 - Modify procedure to reflect the options and specify the parameters
 - Heat exchanger parameters:
 - Coolant inlet temperature: 88°C
 - Coolant outlet temperature: 93°C
 - Coolant flow: 65 l/min
 - All temperatures to be held within $\pm 1^\circ \text{C}$
 - Process water inlet temperature: 27°C – can vary per lab
 - Coolant pressure drop: 1.5 kPa maximum
 - Process water pressure: 335 kPa

Heat exchanger part numbers

7B5946	CORE
7B8560	BODY
7B8561	COVER
5B8971	TANK - TOP
1Y7538	TANK - BOTTOM
5B8993	COVER
5B8994	GASKET
5B9762	GASKET
5B9676	GASKET
1Y7190	COVER
6B0204	GASKET
1Y7443	COVER



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Heat Exchanger Information, 5/21/2015

Options:

Labs to order: Shell & tube core that provides same parameters order from Industrial Radiator Inc (see below) (SO277026 – reference # for TIR)
Stainless and Nickel

Labs to order: replacement directly from Modine (Modine P/N)
Material?

Point of Contact:
Rusty Dodd
Phone: 210-666-5500
Fax: 210-666-6800
Texas Industrial Radiator Incorporated
5314 IH10 East
San Antonio Texas, 78219

Rusty said he can have the heat exchangers made using the current heat exchanger he already has.

If we can supply blue prints that would be helpful but not necessary.

If you have pressure specs that would also be helpful.

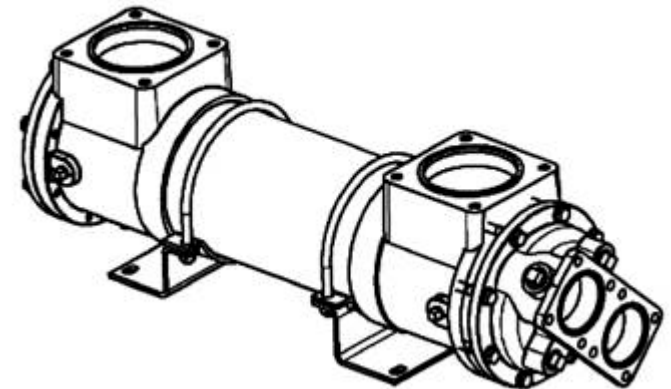
Anything we can supply would be better for him.

There is no minimum order. Once they start making them you could order one or twenty.

During our conversation I mentioned that he would have to be approved by Caterpillar as a vender. He said he was already a Caterpillar approved vender.

Thanks,
Manuel. Leos
Intertek Automotive Research

Modine heat exchanger: full component and gaskets between the shell and the end bonnet castings.



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Water pump and heat exchanger

6/30/2015

For the water pump and heat exchanger: procedure allows “equivalent”

Flow rates and Delta T have to provide the correct parameters.

There may be some flexibility needed in the flow rate.

In order to keep the same flow rates, the load on the dyno may be modified.

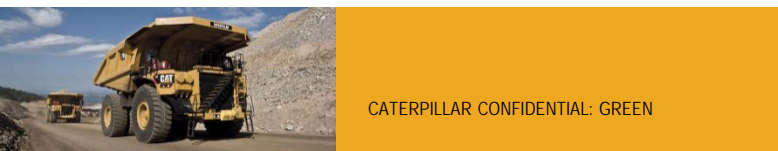
Procedure will be modified to reflect above.

Adam: volunteered to make the necessary changes.

Motion will be given once we have the changes.

07/21/2015

1Y0667 pumps: request to place orders to take advantage of parts availability and volume.



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1K/1N Oil Pump

- Cat identified supplier for current pump replacement
 - The pump, P/N: 1Y0667, is available at Cat Parts distribution system. This is Made-to-Order part.
 - Recommendation: Place orders. In order to manage cost and time, order pumps needed for the foreseeable future at one time.
 - Supporting parts: P/N: 4B0559, 4B0560, 4B0570 are **not available**.
 - Drive shaft from governor housing 1Y-5791: check availability?

Timeline:

Full pump assembly 1Y0667 available to order as an assembly

4B parts are not available

Ordering the assemblies you need long term will ensure lower cost since these will be MTO

1Y0667 Volumes proposed by the labs: 5+5+6+3

7/21/15

Supplier inquiring about orders.
Have orders been placed?

Oil pump parts

1Y0667	Pump
4B0559	GEAR (DRIVE) 10 TEETH
4B0560	GEAR (IDLER) 10 TEETH
4B0570	BODY
1Y7558	ADAPTER
1Y0668	BODY



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Other 1K/1N parts

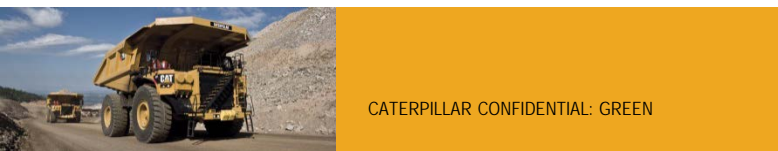
- 1Y0564, rocker arm shaft: Available (MTO) - place orders
- 1Y0609, Bracket: available through the system (8 available)
- 4N5614, Rocker Arm: Available
- 1Y0692, Crank shaft: Available (large volumes)
- 1Y0698, bracket-oil filter: available – place orders

1N liner porosity: some liners appeared of high porosity (pepper like) and surface roughness is higher. **Porosity is key component**

Bob will verify their last batch and send information: need information

Ra has been higher recently than the past (now in the 30s not the 20s as before) **(Ra may not be as important – porosity and oil retention (valley volume))**

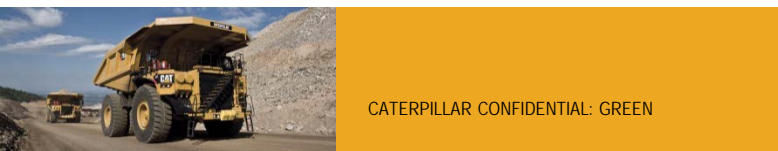
1N liner availability: no issues with the supply. Orders will be fulfilled



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1K/1N

- 1Y1947 is not available.
 - Will be procured by Cat



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1P/1R liners, 5-21-2015. 6/30/2015

- New 1P liners, 1Y3997:
 - New supplier, improved casting for consistency
 - New Surface roughness and porosity measurements techniques (baseline was liners from the 2012 vintage)
 - Currently, 60 total batch (need to be packaged and made available; potentially by end of June).
 - Can ship/send liners for the Ref tests
- Status
 - 1P test conducted at Intertek. Data discussed in work group meeting
 - Oil consumption was statistically higher than limit. Other parameters within the limits
 - Decision to run three more tests – reference the stands on this new liner.
 - Provide three more data points for analysis - preferred.
 - Will move forward with two data points – third data point may be delayed.



1P/1R Crankshaft Assembly, 6-30-2015

- 1Y3736 is not available
 - Work on availability started. How were these parts ordered? Through the dealer?
 - Information needed:
 - What is the mode of aging: wear out
 - Are the worn-out parts still available?
 - How many parts are/will be needed?
 - 5 or 6 are needed

07/21/2015

Options:

- 1- procure the part through a supplier (being developed)
- 2- rebuild worn out parts with additional material: need parts back
- 3- undersize worn out parts and oversize bearings to fit: need parts back



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C13 Aeration test Gaskets

- Oil Pan and Valve Cover solutions:
 - Si free Fiber gasket: working on availability in the system.
 - May be 2 - 3 months
 - New part numbers. Have to be required only for the aeration test
 - Spacer
 - Will make the prints available for the labs to make in-house
- Front cover seal
 - Can be replaced with a Si-free alternative.
 - Do we need a replacement for this part?
 - Can we keep using the current part? **Keep using production part**
 - Options to reduce Si leaching from this gasket? Would it passivate quickly?

20 gasket sets can support ~1200 tests?
Potentially order 60 gaskets each for oil pan and valve cover

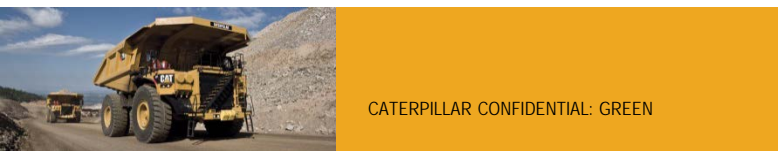
07/21/2015
Two Si-free gaskets are in the process of procuring: ~2 months
Two spacer parts are finalized and ready to release to TMC



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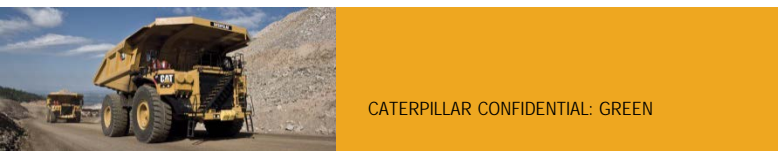
Action: 1K

- SV: 1K severity analysis similar to 1N
 - Elisa needs to look at this.
- Next meeting: Tuesday July 21; 1-3 CST
 - Data analysis by Elisa
 - 1P liner data analysis
 - C13 proposed new data collection
 - Changes to parts/procedure for 1K/1N
- Aeration test: Mid July,
 - Updates on the test and current activities
 - Work with both surveillance panels to get consensus of moving from EOAT to COAT (moving Coat to the surveillance panel also)



Resolved Parts

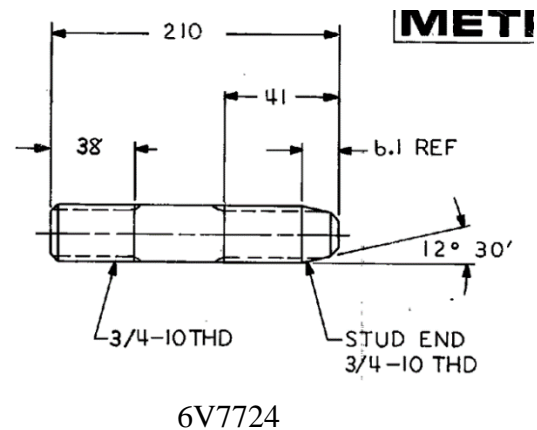
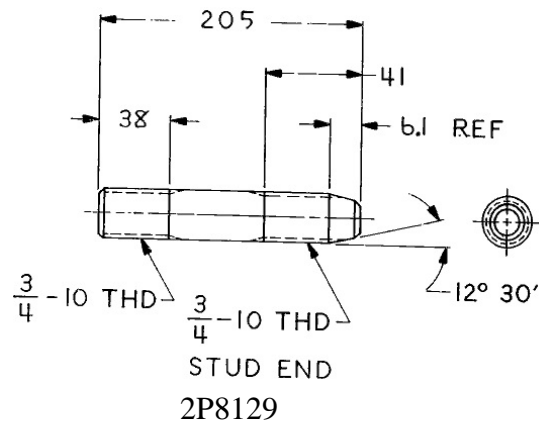
- Parts with identified replacement parts



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Other parts

- 1A0607, Gear, Governor: New supplier identified
 - Process to stock the part in Cat Distribution System initiated
 - ? How many are needed? 20 pieces for the next 10 years
- 1Y0088 (Gasket) and 2A2698 (Pin): no trace in our systems
 - Possible misspelled Part numbers? [Actual #s: 1Y1988 \(available\)](#) ; [and 2A2968](#)
 - Otherwise: need the parts to make alternatives
- 1Y0601, Gasket: [Available \(4/28/15\)](#)
- 2P8129, stud, Cly blk-jug mounting: alternative identified: 6V7724
 - Will require a washer to compensate for the length

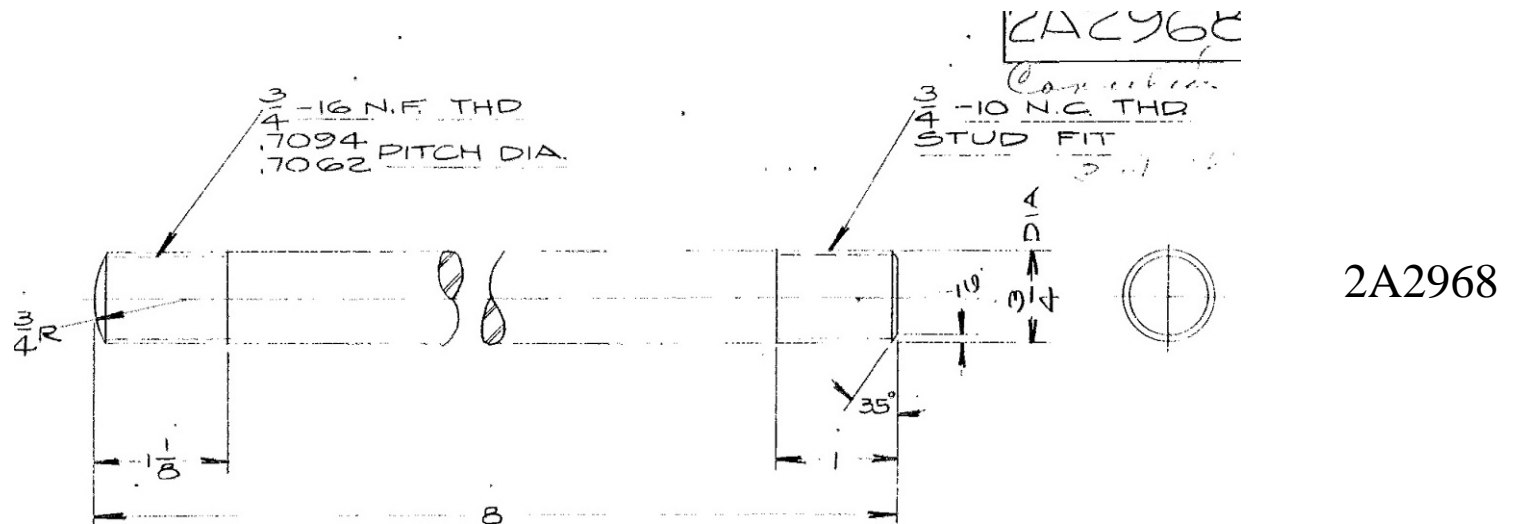
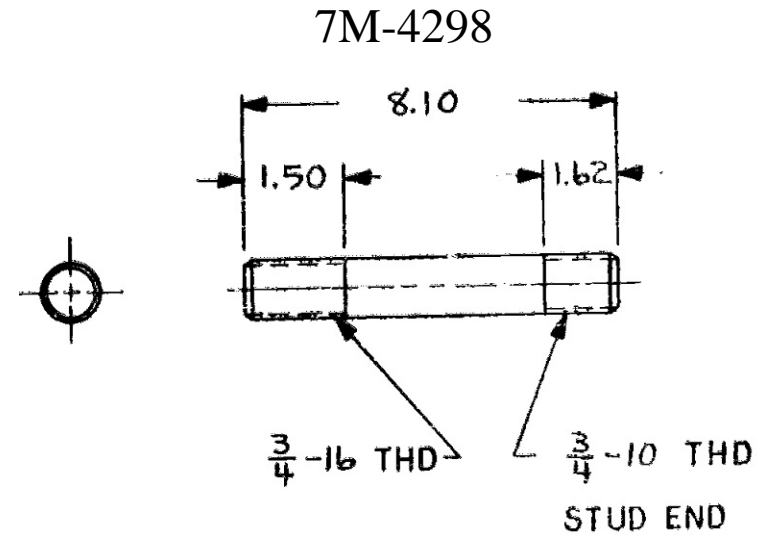


5 mm longer
 Washer can be added
 under the nut
 Or one of the ends
 machine-turned shorter



Pin replacements

- Replacement for 2A2968
 - Two options: 7M-4298 or 6V-7724 (proposed as replacement for 2P-8129 also)
 - Material and heat treatment is the same or similar
 - Both have slight differences in the overall length and in the length of the thread depth on both ends.
 - **Action:** labs to confirm based on the dimensions given that the replacements work and identify preferred



1P Timing Sensor

- Timing sensor 1Y3859 could not be made available. Alternative solution described below
 - **Next Steps:** Issue resolved
 - use the modified sensor as described

From: Larch, William
Sent: Wednesday, July 31, 2013 9:59 AM
To: Campbell, Bob
Cc: Stevens, Andrew
Subject: Cat 1P timing sensor

Hi Bob,

Back in 2010 I worked with Kevin Daly concerning timing sensors for the Cat 1P. I have included the part number we have been using since. I also checked with my local vendor and it is still a good part number.

The old part number was 1Y3859. The new part number is 266-8576. With this new sensor 2 other parts are going to be required. The first part number is 8T-8730 and I need 3 for each sensor. The next number is 155-2260. It is a plug. The pins and plug are needed to fit the 1P wiring harness.

We cut the lock nut in half to allow for proper insertion of the sensor into the bore. Otherwise the sensor is too far from the gear train to pick up a signal. The sensor is threaded into the bore with the gear at its high point until it slightly makes contact. Then it is backed out one revolution and locked with the nut.

Hope this helps!

Please feel free to call me with any questions.

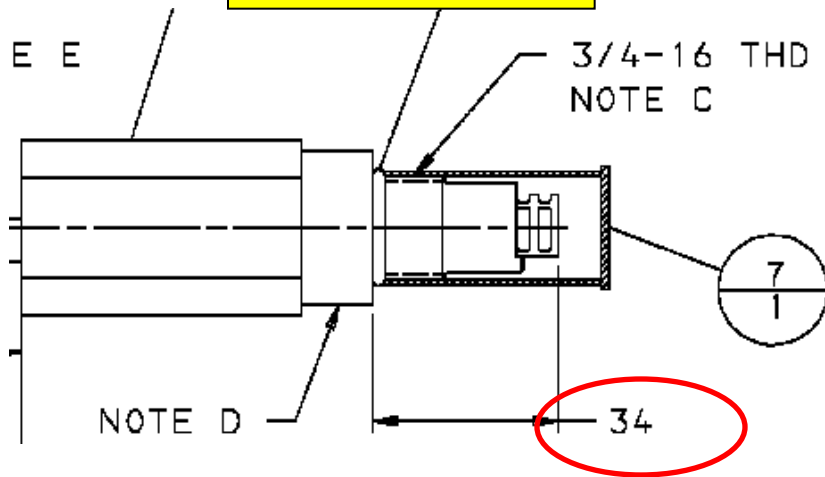


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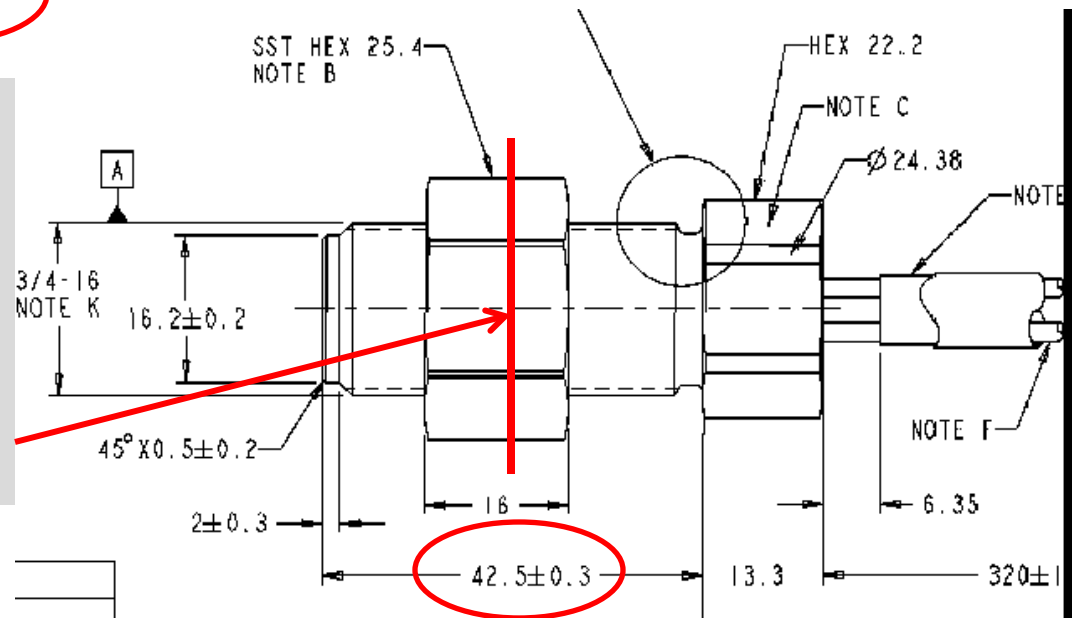
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1P Timing Sensor Replacement

1Y3859 Sensor



266-8576 Sensor



The original 1Y3859 sensor was 34mm to the sensor tip. The new sensor is shorter with the existing lock nut 42.5-16 = 26.5mm. Therefore, the lock nut needs to be cut in half in order to allow the sensor to be inserted to the right depth.

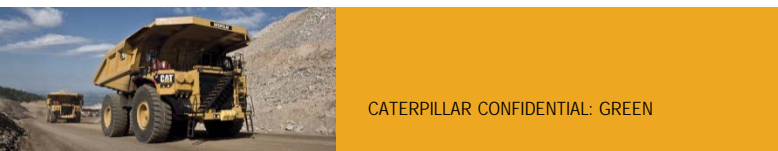


May 4, 2016

- 1Y-7246 needle valve
 - 2 used in 1Y455 (Control group-Temp, oil and water)
 - Valve is ¼ NPT F and 1/4 -18 NPT F
 - Proposal: labs to procure on their own.

June 9, 2016

- Additional option: use Cat 1S8937 (Brass needle valve)



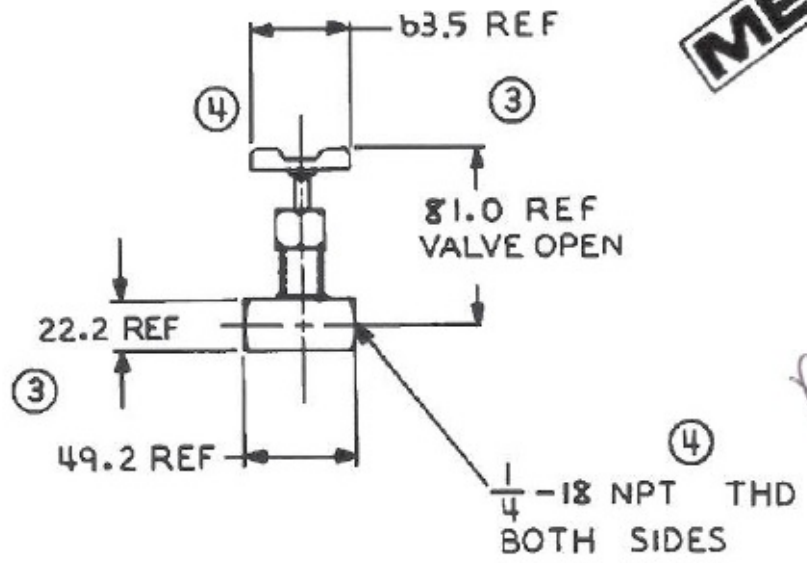
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June 9, 2016

Replace 147246
inable ↔

METRIC



BRASS

- Option 1S8937 – Brass Needle valve

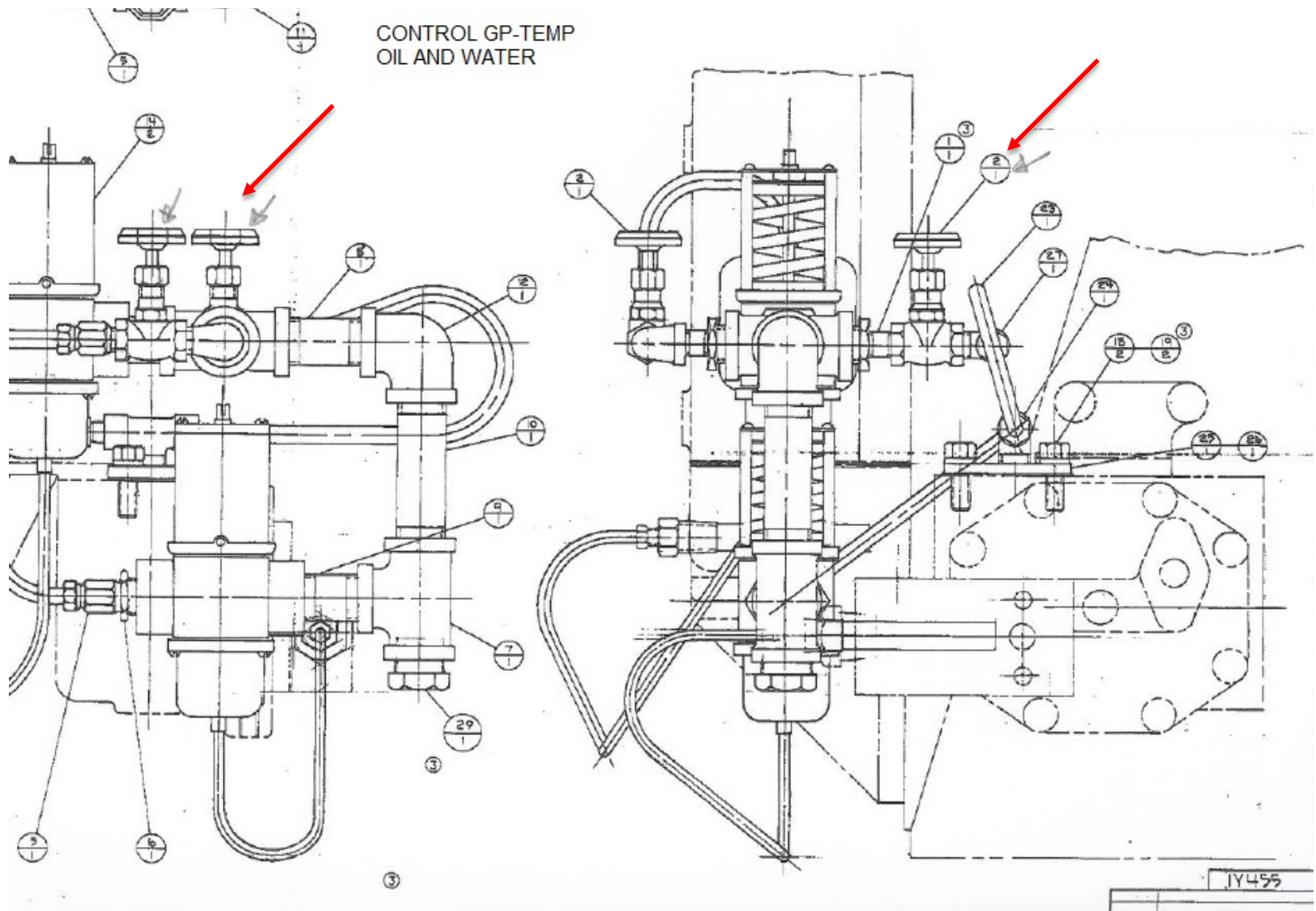
PATTERN - FFG
 PRESSURE RANGE - 0-69000 kPa
 TEMP RANGE - 40° TO 260°C
 CONNECTION - DOUBLE FEMALE

1S8937

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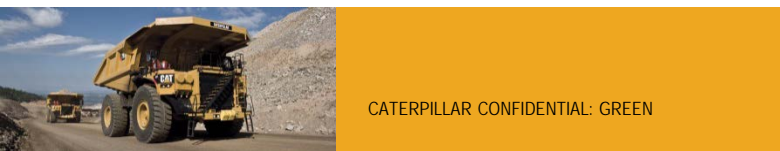
June 9, 2016 – Control system where 1Y7246 is used



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June 9, 2016 – Si-free gaskets for COAT

- Two new gaskets:
 - 481-7229
 - 481-7230
- Both are available in the Cat distribution system

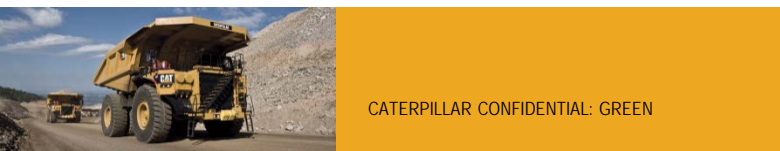


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June 9, 2016 – Needed parts

- 1Y3736, Crankshaft, 1P
- 1Y5791, Shaft, 1N oil pump (?)

- Will continue to work on the availability



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