

INSPECTION REPORT

CUSTOMER : EKPC - Cooper
REPORT NO. : 55294-IR1

REPORT DATE : 04/20/16
PAGE : 2 of 4

- 3) Pressure Reducing Sleeve
 - a) There is moderate circumferential wear and grooving on the sealing turn resulting in excessive running clearance to the pressure reducing bushing.
 - b) The sleeve fit bore measures close to the expected design diameter, but is lightly fretted and worked out of round.
- 4) Spacer Sleeves
 - a) All of the spacer sleeves have moderate contact grooving on the wear turns. .
 - b) The fit bores and axial lengths all measure to the appropriate design dimensions.
- 5) Impeller Lock Nut and Pressure Reducing Sleeve Lock Nut
 - a) Both shaft nuts have pulled spanner holes and light mechanical damage from disassembly.
 - b) Both shaft nuts have light to moderate wear on the outer turn from contact with the stuffing box bushing.

II. Stationary Components

- 6) Suction Cover
 - a) The cover is in good condition with no visible erosion damage.
 - b) The fit interference to the first casing cover is actually a very small clearance fit.
 - c) The case ring has light eccentric wear resulting in excessive running clearance to the impeller wear turn.
- 7) Casing Covers (Series)
 - a) All casing covers are in good condition with no visible erosion or damage. All diffuser vanes are in good condition and none of the diffuser welds are broken.
 - b) The stage length of all of the casing covers all measure within tolerance of the design value.
 - c) Both the cover bushings and wear rings are lightly worn resulting in excessive running clearances to the impellers and spacer sleeves.
 - d) The diffuser vanes all have appropriate axial clearance between casing sections.
 - e) All register fits between casing sections are actually small clearances as opposed to light interference fits.
- 8) Discharge Spacer
 - a) The discharge spacer is in good condition with no vane damage or erosion.
 - b) Both the cover bushing and wear ring are lightly worn resulting in excessive running clearance to the impeller and spacer sleeve.
 - c) The register fit turn and register fit bore both measure to the expected diameter; however, as previously mentioned, the resulting fits are light clearances instead of the design interference.

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9) Discharge Diffuser

- a) The discharge diffuser is in fair condition.
- b) The fit bore to the discharge head is marginally over the design diameter, and the bore has some gall marks and working damage from the end head and gasket spacers.
- c) The fit turn to the discharge spacer measures marginally undersize resulting in excessive fit clearance.

10) Pressure Reducing Bushing

- a) The clearance bore to the pressure reducing sleeve has light wear, and the resulting running clearance to the pressure reducing sleeve is just beyond tolerance.
- b) The tac welded hardware holding the bushing in place on the discharge head is in good condition with no visible wear or cracks.

11) End Head

- a) Both gasket faces have some very light water erosion or pitted areas; for the internal gaskets, it looks like there are wash or drag marks on the fit turn to the discharge diffuser.
- b) Similar to the discharge diffuser, there is light working damage from the gasket spacer.
- c) There is a very small area of overlay weld at the flange to fit turn interface. It can only be assumed that this was an attempt to get a metal to metal seal on the inside of the flange face. The weld has started to corrode.

12) Assembly Rail and Keys

- a) The assembly rail has some drag marks and light galls, but it is straight overall and can be re-used.
- b) The impeller keys are all in good condition.

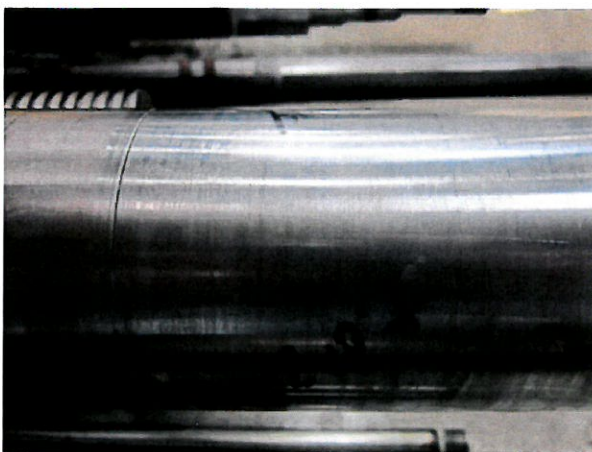


Photo 1: Typical Bearing Journal Wear

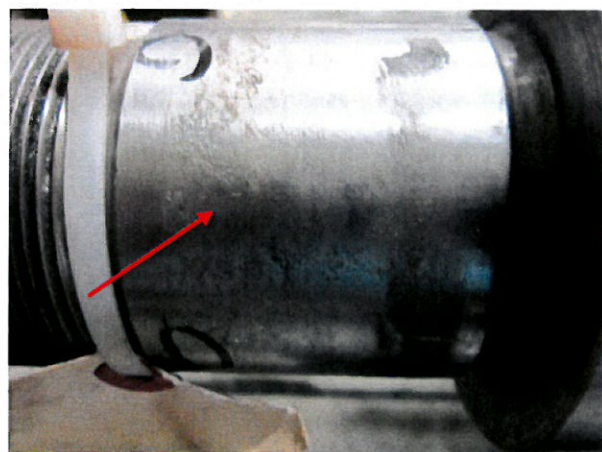


Photo 2: Shaft Fretting On Thrust Collar Fit

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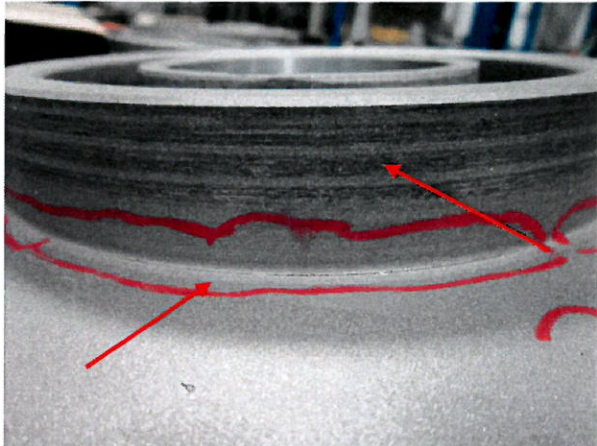


Photo 3: Typical Impeller Wear And Indications

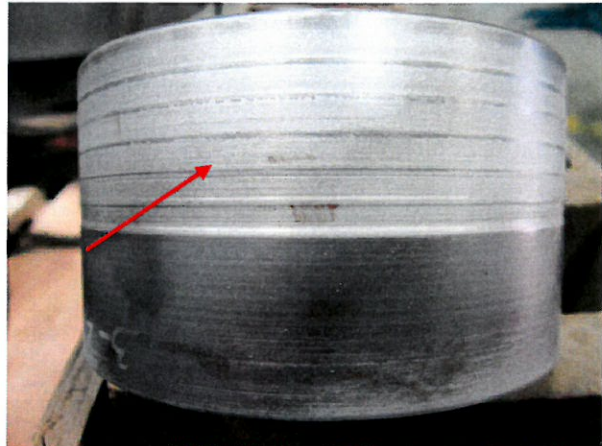


Photo 4: Typical Wear On Spacer Sleeves

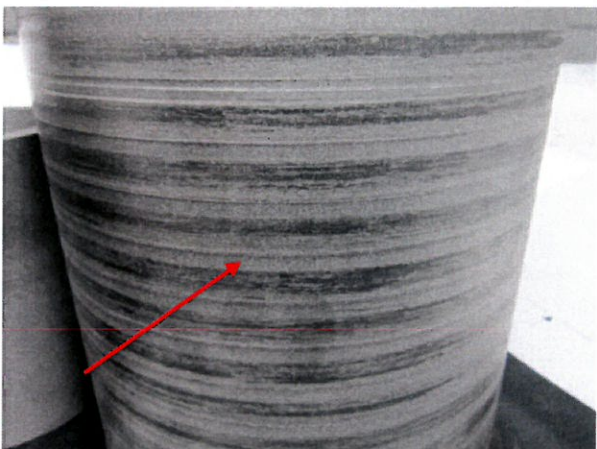


Photo 5: Wear On Pressure Reducing Sleeve

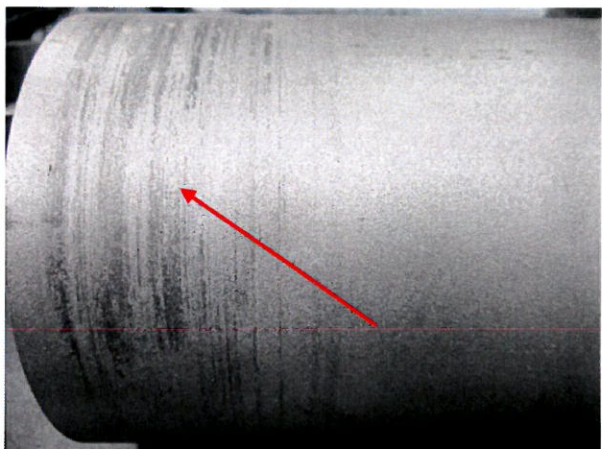


Photo 6: Typical Wear On Shaft Nuts

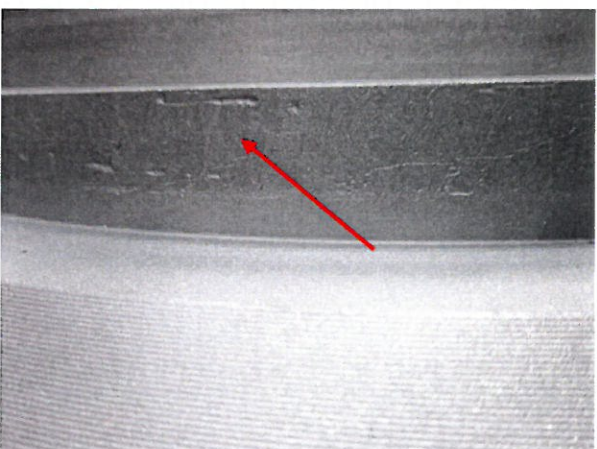


Photo 7: Light Wash Or Drag Marks On End Head

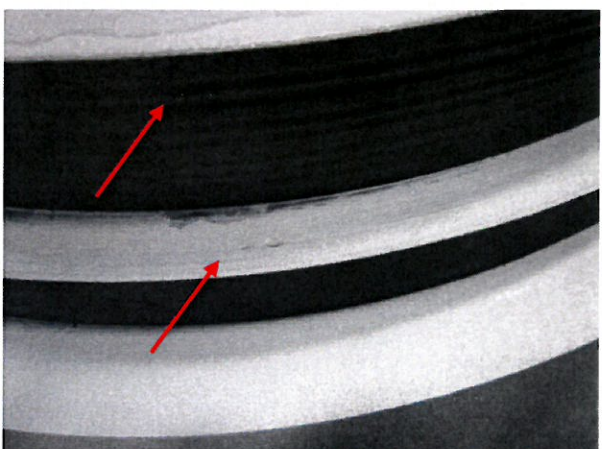
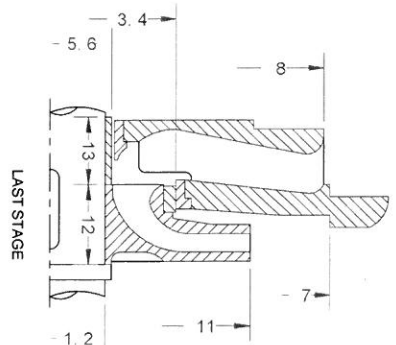
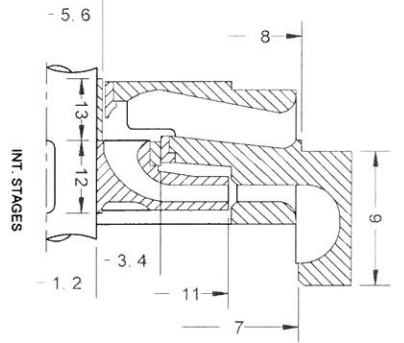
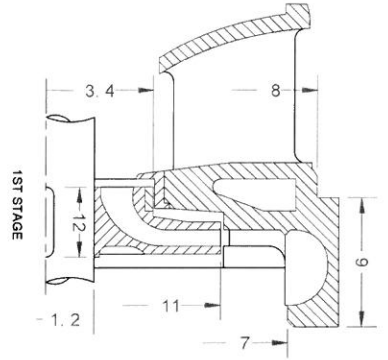


Photo 8: Gasket Face Damage On End Head



LOC	DESCRIPTION	IMP #1	IMP #2	IMP #3	IMP #4	IMP #5	IMP #6	IMP #7	IMP #8	IMP #9	IMP #10	IMP #11
1	IMPELLER BORE DIA.	3.626	3.625 - 3.626	3.626 - 3.627	3.626 - 3.627	3.626	3.626 - 3.627	3.625 - 3.626	3.625 - 3.626	3.626	3.626 - 3.627	3.626 - 3.627
2	SHAFT DIA @ IMP.	3.623	3.623	3.623	3.623	3.623	3.623	3.623	3.623	3.623	3.623	3.623
	CLEARANCE	.003	.002 - .003	.003 - .004	.003 - .004	.003	.003 - .004	.002 - .003	.002 - .003	.003	.003 - .004	.003 - .004
3	CASE RING BORE	8.519 - 8.522	7.390 - 7.392	7.392 - 7.394	7.390 - 7.392	7.390 - 7.392	7.391 - 7.393	7.390 - 7.391	7.391 - 7.393	7.392 - 7.393	7.391 - 7.393	7.390 - .391
4	IMP EYE TURN	8.503 - 8.505	7.372 - 7.374	7.372 - 7.374	7.372 - 7.374	7.372 - 7.373	7.371 - 7.374	7.373 - 7.375	7.372 - 7.374	7.373 - 7.374	7.371 - 7.374	7.373 - 7.374
	CLEARANCE	.014 - .019	.016 - .020	.018 - .022	.016 - .020	.017 - .023	.017 - .022	.015 - .018	.017 - .021	.018 - .022	.018 - .022	.016 - .018
5	BUSHING BORE	4.274 - 4.277	4.273 - 4.275	4.277 - 4.279	4.276 - 4.278	4.277 - 4.279	4.277 - 4.278	4.276 - 4.278	4.274 - 4.276	4.275 - 4.277	4.273 - 4.275	N/A
6	SPACER SLV TURN	4.257 - 4.260	4.258 - 4.260	4.257 - 4.260	4.256 - 4.260	4.257 - 4.260	4.256 - 4.260	4.256 - 4.260	4.255 - 4.260	4.256 - 4.260	4.255 - 4.260	N/A
	CLEARANCE	.014 - .020	.013 - .017	.017 - .022	.016 - .022	.017 - .022	.017 - .022	.016 - .022	.014 - .021	.014 - .020	.015 - .022	N/A
7	CASE FIT BORE	17.372	17.373	17.372 - 17.373	17.372 - 17.374	17.372 - 17.373	17.373	17.374	17.372 - 17.373	17.373	17.373 - 17.374	17.372
8	CASE FIT TURN	17.370 - 17.371	17.371 - 17.372	17.372	17.372	17.372	17.371 - 17.372	17.372	17.372	17.371 - 17.372	17.372	17.249
	CLEARANCE	.001 - .002	.001 - .002	(.000) - .001	.001 - .002	(.000) - .001	.001 - .002	.002 - .003	(.000) - .001	.001 - .003	.001 - .002	.003
9	STAGE LENGTH	5.001	4.999	5.001	5.000	4.999	5.000	5.000	5.001	4.999	5.001	N/A
10	NUMBER OF VANES	7	6	6	6	6	6	6	6	6	6	6
11	IMPELLER DIA.	12.375	12.380	12.370	12.370	12.375	12.375	12.375	12.370	12.380	12.370	12.375
12	HUB LENGTH	2.745	2.742	2.751	2.745	2.750	2.741	2.746	2.748	2.752	2.751	2.743
13	SPACER SLV LENGTH	2.251	2.249	2.250	2.250	2.251	2.251	2.251	2.250	2.249	2.249	2.251

ENGINEERED PUMP SERVICES, INC.
 NUKWONAGO, WISCONSIN

01	AC 04-20-16	PART NAME: PUMP INSPECTION
02		PART NO. : 105-500-003
03		MATERIAL : PACIFIC 6" LS-11 STAGE
04		WEIGHT : LBS.
05		DRAFT: DSB
06		SCALE : NTS
07		PAGE : 2 OF 2



LAFAYETTE TESTING SERVICES, INCORPORATED

3710 N. Richards Road, Milwaukee, WI 53212 1-800-337-4884
L-A-B Accredited Certificate Number L2243

MAGNETIC PARTICLE INSPECTION CERTIFICATION REPORT

CUSTOMER		LOCATION/CONTACT		DATE	PAGE #
ENGINEERED PUMP SERVICES		LTS, INC		3-31-2016	1 OF 1
P.O. NUMBER	ITEM DESCRIPTION/PN		LOT NUMBER		QUANTITY
36461	SHAFT		N/A		1
JOB NUMBER	JOB NO.	SURFACE CONDITION		MATERIAL TYPE	
W0316-43693	55294-01	AS MACHINED		CARBON STEEL	
TYPE OF EXAMINATION		EXAMINATION STANDARD		ACCEPTANCE STANDARD	
MAGNETIC PARTICLE		ASTM E 709		CUST SPEC / NO LINEARS	
ADDITIONAL INSTRUCTIONS/INFORMATION		NDE PROCEDURE		DRAWING NO. OR PMS NO.	
N/A		QCP 500 REV.3		N/A	
MT EQUIPMENT TYPE	MT EQUIPMENT SERIAL NUMBER	VEHICLE TYPE	VEHICLE BATCH NUMBER	PARTICLE TYPE	PARTICLE BATCH NUMBER
PARKER HAND YOKE	19772	WATER	N/A	14A	01-9130-80
CURRENT TYPE	PARTICLE APPLICATION METHOD	CIRCULAR FIELD AMPERAGE		LONGITUDINAL FIELD AMPERAGE	
DC	SPRAY	N/A		N/A	
ITEM/PART NUMBER		ACCEPT	REJECT	DEFECT TYPE/REMARKS	
SHAFT		1	0	NO REJECTABLE INDICATIONS NOTED	
Technician: JUSTIN PEARSON		Level: II	Date: 3-31-2016	COMMENTS/SKETCH: JOB NUMBER: 55294 CUSTOMER: EKPC-COOPER PUMP: PACIFIC 6" HL-11 BFP	
SIGNATURE ON FILE					
Technician:		Level:	Date:		

Nondestructive Testing Services performed in accordance with LTS, Inc. Quality Manual dated 04/05/2011

Lafayette Testing Services, Inc. the contractor will use reasonable effort to assist the customer in the selection of appropriate tests and locate or measure discontinuities or characteristics of the type which normally can be located or measured by these tests. The contractor hereby certifies that the parts listed have been tested in conformance with the specifications noted. This report represents the contractor's interpretation of the results obtained from the tests and is not to be construed as a guarantee or warrant of the condition of the material tested. The liability of the contractor (and/or officers, agents and employees) as to any item inspected (including any inability as to the selection and/or results of such tests) is not in any event to exceed (the charge by the contractor for inspections of that item). Contractor shall not be held liable for misinterpretations or conditions, loss, damage, injury or death rising from or attributed to delay preceding a test or subsequent to performance of a test. Unless otherwise agreed, radiographs remain the property of the contractor. In no event shall contractor have any liability for any consequential or injured damages of any nature whatsoever.

Form 500-1 Rev. 8 Issued 04/13/2011 Approved By: Terry DiLorenzo Title: President



LAFAYETTE TESTING SERVICES, INCORPORATED

3710 N. Richards Road, Milwaukee, WI 53212 1-800-337-4884

ULTRASONIC INSPECTION CERTIFICATION

CUSTOMER		LOCATION/CONTACT		DATE	PAGE #
ENGINEERED PUMP SERVICES		LTS, INC		3-31-2016	1 OF 1
P.O. NUMBER	ITEM DESCRIPTION/PN		LOT NUMBER		QUANTITY
36461	SHAFT		N/A		1
JOB NUMBER		JOB NO.	SURFACE CONDITION		MATERIAL TYPE
W0316-43693		55294-01	AS MACHINED		CARBON STEEL
TYPE OF EXAMINATION		EXAMINATION STANDARD		ACCEPTANCE STANDARD	
ULTRASONIC		ASTM A 578		NO CRACKS OR SEAMS ALLOWED	
ADDITIONAL INSTRUCTIONS/INFORMATION		NDE PROCEDURE		DRAWING NO. OR PMS NO.	
N/A		QCP 600 REV.3		N/A	
UT EQUIPMENT TYPE	UT EQUIPMENT SERIAL NUMBER	TRANSDUCER TYPE	TRASDUCER SIZE	TRANSDUCER SERIAL NUMBER	COUPLANT BATCH NUMBER
PANAMETRICS	070146603	C106	0.5"	579177	14A REDI-BATH 01-9130-80
SENSIVITY LEVEL		CALIBRATION BLOCKS SIZE/SERIAL NUMBER		TECHNIQUE DESCRIPTION	
41.1 DB		DSC / 788		RASTER SCAN / BACK WALL REFLECTION	
ITEM/PART NUMBER		ACCEPT	REJECT	DEFECT TYPE/REMARKS	
SHAFT		1	0	NO REJECTABLE INDICATIONS NOTED	
Technician: JUSTIN PEARSON		Level:	Date:	Comments/Sketch: JOB NUMBER: 55294 CUSTOMER: EKPC-COOPER PUMP: PACIFIC 6" HL-11 BFP	
SIGNATURE ON FILE		II	3-31-2016		
Technician:		Level:	Date:		

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LAFAYETTE TESTING SERVICES, INCORPORATED

3710 N. Richards Road, Milwaukee, WI 53212 1-800-337-4884

L-A-B Accredited Certificate Number L2243

MAGNETIC PARTICLE INSPECTION CERTIFICATION REPORT

CUSTOMER		LOCATION/CONTACT		DATE	PAGE #
ENGINEERED PUMP SERVICES		LTS, INC		3-31-2016	1 OF 1
P.O. NUMBER	ITEM DESCRIPTION/PN		LOT NUMBER		QUANTITY
36463	IMPELLERS		N/A		11
JOB NUMBER	JOB NO.	SURFACE CONDITION		MATERIAL TYPE	
W0316-43699	55294-01	AS RECEIVED		STEEL	
TYPE OF EXAMINATION		EXAMINATION STANDARD		ACCEPTANCE STANDARD	
MAGNETIC PARTICLE		ASTM E 709-08		CLIENT SPEC / NO LINEARS	
ADDITIONAL INSTRUCTIONS/INFORMATION		NDE PROCEDURE		DRAWING NO. OR PMS NO.	
N/A		QCP 500 REV.3		N/A	
MT EQUIPMENT TYPE	MT EQUIPMENT SERIAL NUMBER	VECHILE TYPE	VEHICLE BATCH NUMBER	PARTICLE TYPE	PARTICLE BATCH NUMBER
V1-60	88001	CARRIER #2	7346L15	14A	14K082
CURRENT TYPE	PARTICLE APPLICATION METHOD	CIRCULAR FIELD AMPERAGE		LONGITUDINAL FIELD AMPERAGE	
DC	SPRAY	2000		N/A	
ITEM/PART NUMBER		ACCEPT	REJECT	DEFECT TYPE/REMARKS	
IMPELLERS		0	11	LINEAR INDICATIONS 1/16" TO 4"	
Technician: ANTHONY PADRON		Level: II	Date: 3-31-2016	COMMENTS/SKETCH:	
Technician:		Level:	Date:	CUSTOMER INFORMATION:	
				Job Number: 55294	
				Customer: EKPC - Cooper	
				Pump: Pacific 6" HL-11 BFP	

Nondestructive Testing Services performed in accordance with LTS, Inc. Quality Manual dated 04/05/2011

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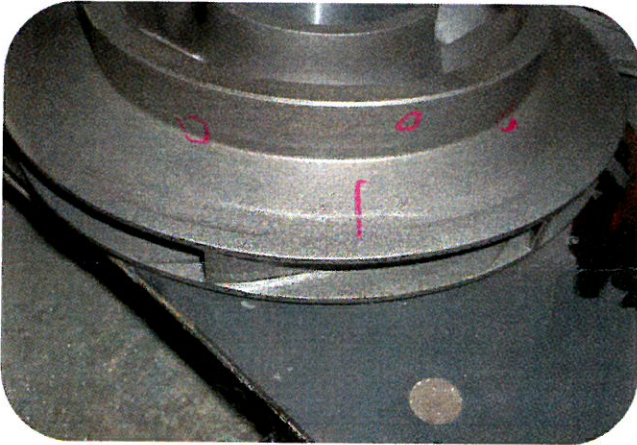


LAFAYETTE TESTING SERVICES, INCORPORATED

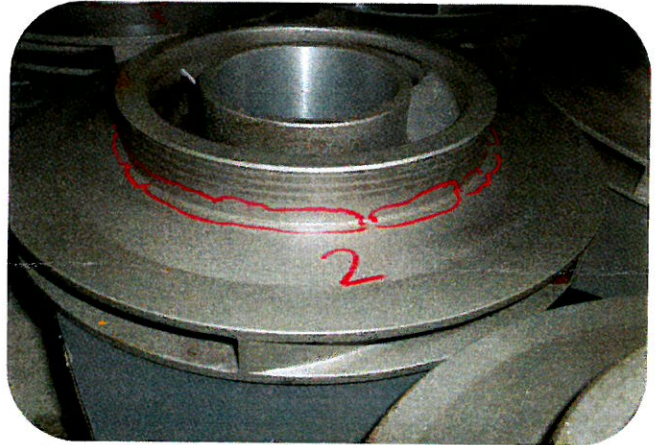
3710 N. Richards Road, Milwaukee, WI 53212

Defect Map

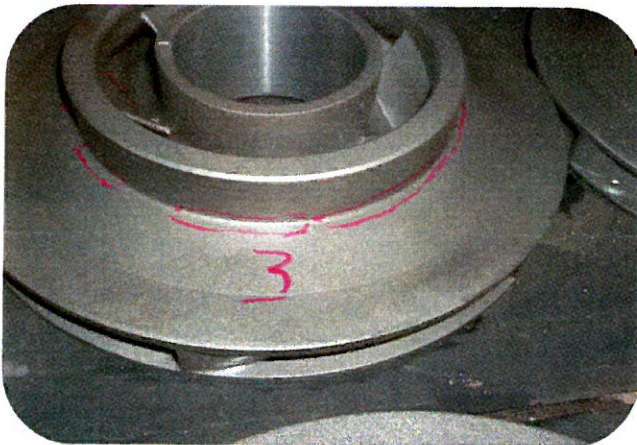
Customer: EPS	Date: 3/31/16
Part Number: Impellers	Customer P.O. Number: 36463
Job Number: W0316-43699	



Linear indications found on hub turn from 1/16" – 3/16".



Linear indications found on hub turn and vane outlet from 1/16" – 4".



Linear indications found on hub turn from 1/16" – 4".



Linear indications found on hub turn from 1/16" – 3/16".



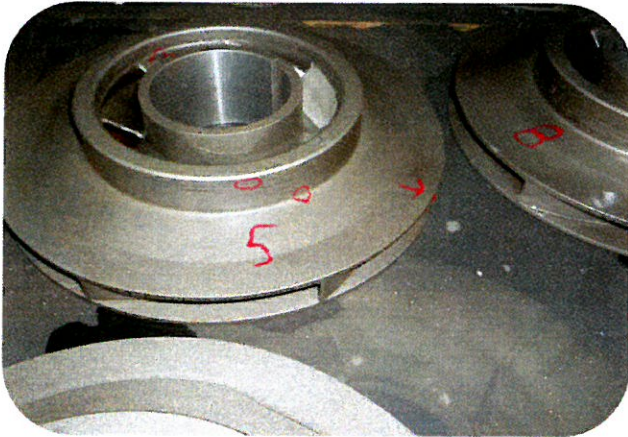
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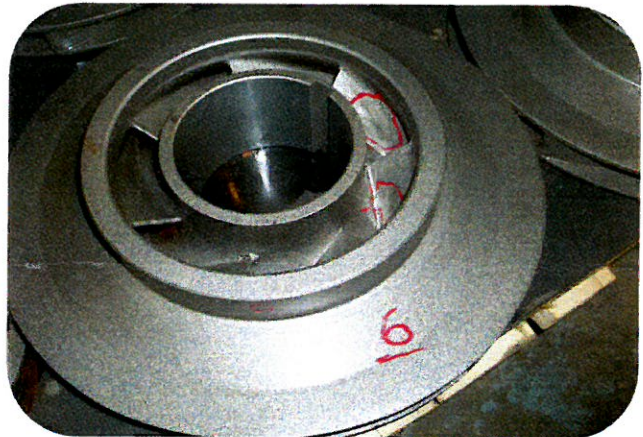
Defect Map

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Customer: EPS	Date: 3/31/16
Part Number: Impellers	Customer P.O. Number: 36463
Job Number: W0316-43699	



Linear indications found on hub turn and vane outlets from 1/16" - 1/4".



Linear indications found on hub turn and vane inlets from 1/16" - 1/2".



Linear indications found on hub turn from 1/16" - 1/8".



Linear indications found on hub turn and vane inlet from 1/16" - 1/4".



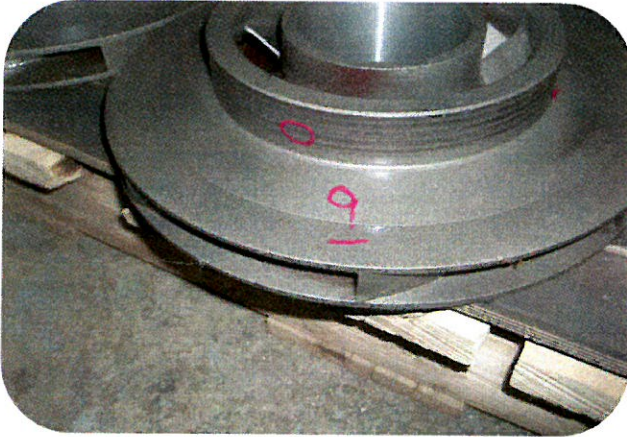
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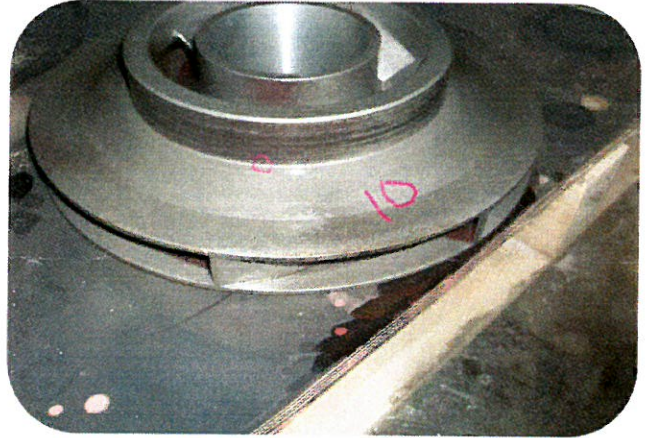
Defect Map

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Customer: EPS	Date: 3/31/16
Part Number: Impellers	Customer P.O. Number: 36463
Job Number: W0316-43699	



Linear indications found on hub turn from 1/16" – 1/8".



Linear indications found on hub turn at 1/4".



Linear indications found on hub turn from 1/16" – 3/16".