

CHICAGO FLUID POWER CORPORATION

411 North Avenue • Streamwood, Illinois 60103

August 16, 1984

54-282/346

Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Notification of Test Failure

Gentlemen:

To the extent that a component was manufactured to a purchase order stipulating part 10CFR21, we as seller and manufacturer of the component are not clear if it is our responsibility in reporting such failure, but feel obligated, due to the stipulation of part 10CFR21 to do so, that we may be advised if it was necessary at this stage to have reported such failure.

Purchaser: ITT Grinnell of Providence R.I., P.O. P-12211

Seller & Manufacturer of component: Chicago Fluid Power Corporation
Streamwood, Illinois

Component: Snubber cylinders believed to be used for pipe support.
(4 units)

Nuclear Station to be delivered to: Northern States Power,
Prairie Island 1 or 2

Nature of Defect: Rod eye connected to piston rod separated from threaded portion of piston rod at approximately 750,000 lbs stress load. Load requirement is 1,000,000 lbs.

Reason for Failure: Material and material thickness not sufficient to withstand faulted load.

Background: Purchaser hired seller to design and manufacture cylinder snubber to replace existing snubbers in current service. The cylinder snubbers were to withstand 10,000 PSI hydraulic pressure representing 1,000,000 lbs loading. Cylinder snubbers were designed with 5-1/2" thick rod eye and eye mounting. Purchaser then informs seller that the maximum thickness of eye mount and rod eye can only be 2-7/8" thick to match existing mounting space with maximum center to center dimensions established. There were no dimension restrictions on the cylinder itself, but rather only on the eye mount and rod eye. The purchaser was to specify the rod bearing and seal materials and configuration, all other design was to be done by seller. After notification of the requirement of 2-7/8" maximum thickness of the rod

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eye and eye mounting, there was considerable verbal communication between purchaser and sellers engineering departments as to whether the eyes would handle the load, it was determined that if appropriate material and testing of the material were supplied that the faulted load could be obtained mathematically, however, the final determination would be made during testing.

The cylinder snubbers were hydrotested to 10,000 PSI, witnessed, certified, and shipped to purchaser. In order to meet their specifications the purchaser was to sandblast and paint the cylinder snubbers. In doing so, sand particles lodged in some of the fastener holes also did some damage to the rod bearings. Purchaser then sent back the snubbers to have the sand flushed out and sent new rod bearings to replace the possibly damaged ones. This was accomplished and the snubber cylinders were re-assembled, hydro tested again and returned to purchaser to complete actual load testing.

Notification: On 8-14-84, purchaser notifies seller by phone that during load testing a rod eye had separated and could a representative from seller be in purchasers Warren Ohio plant the following morning for evaluation. On 8-15-84, the writer of this report arrived at purchasers facilities to evaluate failure. An additional load test was performed on a third unit after two previous units had separated during this test the third unit separated. It was concluded that seller would return separated pieces to home facilities for further evaluation and that both purchaser and seller would calculate a stress analysis to see if any material with the limited dimensions could withstand the 1,000,000 faulted load, or if by re-designing the rod eye engagement to the threaded portion and adding additional metal would afford the additional strength required. This is the current status of the project.

Conclusion: There are no cylinder snubbers of this manufacturer in service at any nuclear facility. Further, we would like to obtain an invitation to the Northern States Power Prairie Island facility to examine the material specifications and design of the existing cylinder snubbers to see if they could experience this possible failure, considering the high grade materials and testing done on the materials by Chicago Fluid Power Corporation (copies enclosed), or if the existing units have been exposed to actual fault load testing on equipment similar to that owned by ITT Grinnell. As it has become apparent that mathematical calculations do not always agree with actual testing. It is not clear at this time how long the redesign and evaluation and manufacturing will take, an estimate would be 8 to 10 weeks.

Respectfully,



C. R. Mills,
President

CRM/eb

Enclosures

cc: Q/A Dept

AREA CODE 312
587-1000

C00125 3

SCOT FORGE



PLANTS:
CICERO, IL
CLINTON, WI
SPRING GROVE, IL

BOX 8
SPRING GROVE, IL 60081

57931

CHICAGO FLUID POWER CORP
411 NORTH AVE
STREAMWOOD, IL

MATERIAL CERTIFICATION

60103

CUSTOMER ORDER NUMBER	ITEM	OF	CUSTOMER JOB NUMBER	DATE SHIPPED
C-3814-N	1	1	SERIAL#204-1, 204-2, 204-3, 204-4	10/14/83
PART NUMBER	B/P NUMBER	VIA	DATE PREPARED	
	D-1	TURK'S	10/17/83	

DESCRIPTION OF MATERIAL AND SPECIFICATIONS

FORGINGS PER B/P D-1
STEEL TO MEET ASTM A-668 CLASS L
(AISI 4140 A. Q.)

NORMALIZE

QUENCH & TEMPER TO 125,000 TENSILE 105,000 YIELD
16% ELOG 50% RED IN AREA (255/321 BHN)

*HEAT TREATMENT TO BE DONE BY CUSTOMER'S SOURCE -
LINDBERGH HEAT TREATING CO., MELROSE PARK*

PHYSICAL TEST REQUIRED

CHARPY V-NOTCH TEST REQUIRED @ 38 DEGREES F (+-2 DEGREES) TO MEET
15 FT/LBS AVERAGE WITH NO ONE SPECIMEN LESS THAN 12 FT/LBS

* DESTRUCTIVE TESTING TO BE DONE BY CUSTOMER'S SOURCE -

CHICAGO SPECTRO SERVICE LABS, CHICAGO *
ROUGH MACHINE WITH ALLOWANCE TO FINISH
TO SIZES SHOWN ON B/P - 250 RMS

ULTRASONIC TEST REQUIRED PER SS-M-437 PARAGRAPHS 1, 2, 3, & 19

MAGNETIC PARTICLE TEST REQUIRED PER SS-M-437 PARAGRAPHS 1, 2, 3, & 11

LIQUID PENETRANT INSPECTION REQUIRED PER SS-M-437 PARAGRAPHS 1, 2, 3, & 7

* NON-DESTRUCTIVE TESTING TO BE DONE BY CUSTOMER'S SOURCE -
MAGNAFLUX QUALITY SERVICES, ELK GROVE VILLAGE *

NO. OF PIECES 4 HEAT NUMBER LV-8486 (MIL - STANDARD STEEL)

CARBON	MN	PHOS	SU	SI	NI	CR	MO	CU	AL	OTHER	GRAIN
.430	.830	.015	.021	.290	.150	.960	.180	.110			7

* JOMINY HARDENABILITY *

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	24	28	32
59	58	58	57	57	56	55	54	54	53	52	52	51	49	48	45		42	41	40	39

THIS IS TO CERTIFY THAT THE REPORTED LADLE ANALYSIS (AND/OR
TESTS) SHOWN ON THIS REPORT ARE CORRECT AS CONTAINED IN
THE RECORDS OF THE COMPANY.

BY: SCOT FORGE
R. Kuykendall



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PHYSICAL PROPERTIES

PCS	TENSILE PSI	YIELD PSI (.2% OFFSET)	ELONGATION IN 2 - %	REDUCTION OF AREA %	COMMENTS
1	144,600	115,900	17.4	76.7	

IMPACT RESULTS

(CHARPY)	TEMP	1st	2nd	3rd	COMMENTS
	38	20. FT/LBS	19. FT/LBS	18. FT/LBS	

HARDNESS RESULTS

PCS	BRINELL 3000 KG LOAD	SERIAL NUMBER
1	285	204-1
1	285	204-2
1	285	204-3
1	285	204-4

ULTRASONICALLY TESTED & ACCEPTABLE PER SS-M-437
PARAGRAPHS 1, 2, 3, & 19
MAGNETIC PARTICLE TESTED & ACCEPTABLE PER SS-M-437
PARAGRAPHS 1, 2, 3, & 11
LIQUID PENETRANT INSPECTED & ACCEPTABLE PER SS-M-437
PARAGRAPHS 1, 2, 3, & 7

FREQUENCY = .00 SEVERITY = .00
MACROETCH INSPECTED - RESULTS ACCEPTABLE

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BY: R. Keyes SCOT FORGE