

Part 21 (PAR)

Event # 46640

<b>Rep Org:</b> ASCO VALVE	<b>Notification Date / Time:</b> 02/25/2011 08:59 (EST)
<b>Supplier:</b> ASCO VALVE	<b>Event Date / Time:</b> 03/18/2010 (EST)
	<b>Last Modification:</b> 02/25/2011
<b>Region:</b> 1	<b>Docket #:</b>
<b>City:</b> AIKEN	<b>Agreement State:</b> Yes
<b>County:</b>	<b>License #:</b>
<b>State:</b> SC	
<b>NRC Notified by:</b> ROBERT ARNONE	<b>Notifications:</b> WILLIAM COOK R1DO
<b>HQ Ops Officer:</b> DONALD NORWOOD	MARK FRANKE R2DO
<b>Emergency Class:</b> NON EMERGENCY	DAVID HILLS R3DO
<b>10 CFR Section:</b>	VIVIAN CAMPBELL R4DO
21.21 UNSPECIFIED PARAGRAPH	Part 21 Gp via Email

FAILURE OF ACTUATORS DUE TO UNDERSIZED OUTPUT SHAFTS

The following is a synopsis of information received via facsimile:

On March 18, 2010, Samkwange returned an NH90 Hydramotor to ASCO because the motor was not operating when power was applied. ASCO tested the actuator and found all recorded electrical values to be within specifications, however the output shaft did not have any movement. With the mounting plate removed and the pump activated, it was observed that the shaft was not turning with the rotor.

On November 24, 2010, Diablo Canyon Power Plant returned an NH90 Hydramotor to ASCO because the unit was not attaining its full stroke when a signal was applied. The output shaft would start to stroke, but intermittently stopped and the pumping sound ceased. However, normal operating current was noted which indicated that the motor was still running and that a locked rotor condition was not occurring. Further testing revealed that the rotor core was turning on the shaft.

In both of the above cases, it was determined that the output shaft was undersized.

Corrective Action: All rotor-shaft assemblies in ASCO's inventory as of April 22, 2010 were returned to the supplier to confirm that they met specifications. In addition, a static torque test has been implemented for all rotor-shaft assemblies of all pump assemblies manufactured by ASCO since December 10, 2010. Also, all rotor-shaft assemblies that were in ASCO's inventory as of December 10, 2010 successfully completed the static torque test. Finally a static torque test will be performed on all pump kits in AREVA's inventory before they are supplied to customers.

\*\*\*\*\*

IEI9  
NRR

# **ASCO** Valve Manufacturing, Inc.

**AIKEN, S.C.**

**FAX: 803-641-9290**

**FAX**

**NO:**

301-816-5151

**TO:**

NRC Documents Control Desk

**FROM:**

Robert Amone

**DATE:**

February 25, 2011

Attached is letter to NRC Document Controls Desk and one exhibit.

If there are transmission issues, please contact Bob Amone at 803-641-9395.

**PAGES INCLUDING**

**Cover Page**

4



ASCO Valve, Inc.  
1561 Columbia Highway  
Aiken, SC 29801  
USA

T (803) 641-9200  
F (803) 641-9290  
www.asconumatics.com

February 24th, 2011

Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Subject: Interim Report on NH90 Hydramotor Rotor-Shaft Assemblies

Reference A – ASCO letter to AREVA dated 12/30/2010

Gentlemen:

The enclosed information relates to two NH90 Series Hydramotor actuators that were returned from Samkwang Power System (Korea) ("Samkwang") and Pacific Gas & Electric's ("PG&E's") Diablo Canyon Power Plant.

**Background:** One NH90 Hydramotor, model number NH95T4602X0PCD301XXX00X04, serial number A706346-004, was returned from Samkwang on March 18, 2010 due to "motor appeared to be not operating when power was applied". The unit had been supplied by ASCO to Samkwang. ASCO understands that this unit had been installed in a Korean nuclear power station, though not placed into service. ASCO tested the actuator and found all recorded electrical values to be within specifications, however, the output shaft did not have any movement. The mounting plate was removed. When the pump was activated, it was observed the shaft was not turning with the rotor. We notified the customer of our results, replaced the pump assembly, and returned the actuator to Samkwang. As part of our corrective action, the rotor-shaft assembly removed from the unit was returned to our supplier for evaluation on April 6, 2010. The supplier's investigation determined that the outside diameter of the shaft was undersized. In addition, on April 22, 2010, we returned all the 21 rotor-shaft assemblies from our inventory to our supplier for verification that they met specifications. On June 17, 2010, the supplier reported that the 21 rotor-shaft assemblies were in compliance with ASCO's drawing. Based on these verification results and no previous return history for this condition, it was concluded that this was a one-time occurrence.

A second NH90 Hydramotor, model number NH92W6002E2RND304XXX00X18, serial number A168811-004, was returned to ASCO from the Diablo Canyon Power Plant, on November 24, 2010. This unit was not attaining its full stroke when a signal was applied. The output shaft would start to stroke, but intermittently stopped and the pumping sound ceased. However, normal operating current was noted which indicated that the motor was still running, and that a locked rotor condition was not occurring. Pursuant to the Purchase Order for the return of the unit to ASCO, PG&E requested that the investigation be halted until they received a copy of, and approved our plan for investigating the non-conforming operational condition. PG&E approved the investigation plan on December 14, 2010.

After PG&E approved the investigation plan, ASCO resumed the disassembly analysis. The controller was removed from the actuator, and the unit powered up. Blocking the low pressure outlet of the pump amplifier showed that the rotor core was turning on the shaft. The pump was removed from the actuator, and disassembled to remove the rotor assembly.

The rotor assembly was returned to ASCO's supplier for analysis on January 25<sup>th</sup>. Measurements by the supplier showed that the outside diameter of the shaft was below the minimum allowable limit by .0005". The supplier stated that this undersized shaft condition was the root cause of the problem. This condition allowed the rotor to turn on the shaft as the pump pressure increased.

ASCO does not have adequate knowledge of the actual installations and operating conditions of these actuators to determine whether this condition could create a "substantial safety hazard" as defined in 10CFR21.3.

**Interim Action:** Following its receipt of the NH90 Hydramotor from PG&E, ASCO implemented a static torque test on the rotor-shaft assembly of all pump assemblies manufactured at ASCO, effective December 10, 2010. A preliminary report was provided to AREVA (Reference A) on December 30<sup>th</sup>, 2010. Additionally, the static torque test was applied to all 48 rotor-shaft assemblies that were in ASCO's inventory. All 48 units passed the static torque test.

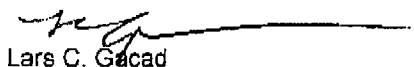
**Continuing ASCO Investigation:** The entire U.S. inventory of NH90 Hydramotor pump kits is held by AREVA. As part of ASCO's ongoing investigation, we requested AREVA to return all 174 pump kits in their inventory. The static torque test will be performed on the rotor shaft assembly of the returned pumps and results will be utilized to better assess the extent of this condition. This process is estimated to take approximately 6-8 weeks to complete. The torque being applied to the rotor-shaft assembly exceeds the maximum torque it experiences in operation. Since the 174 pump kits were produced over a 6 to 8 year period, ASCO believes that testing of these units will be testing of a representative sample of all NH90 Hydramotor units. As of Feb. 24, 12 pump kits have been returned from AREVA and tested. All 12 passed the static torque test.

No units will be supplied to customers from AREVA's inventory until they have been subjected to the static torque test.

**Impact on Performance:** When this condition occurs, the actuator output shaft will not move or will not complete a full stroke. But in both cases, the actuator output shaft will return to the spring extended condition.

**Corrective Action:** As noted above, all rotor-shaft assemblies in ASCO's inventory as of April 22, 2010 were returned to the supplier to confirm that they met specifications. In addition, a static torque test has been implemented for all rotor-shaft assemblies of all pump assemblies manufactured by ASCO since December 10, 2010. Also, all rotor-shaft assemblies that were in ASCO's inventory as of December 10, 2010 successfully completed the static torque test. Finally, a static torque test will be performed on all pump kits in AREVA's inventory before they are supplied to customers.

Sincerely



Lars C. Gacad

ASCO Numatics Americas – Emerson  
Vice-President - Quality, Americas  
(803) 641-9304 Office | (803) 443-3818 Mobile  
Lars.Gacad@emerson.com



ASCO Valve, Inc.  
1561 Columbia Highway  
Aiken, SC 29801  
USA

T (803) 641-9200  
F (803) 641-9280  
www.asconumatics.com

December 30, 2010

Areva  
3315-A Old Forest Road  
Lynchburg, VA 24501

Attn: Glenn Wertz

Ref: Areva PO 1010059326  
ASCO RMA 46036

Dear Glenn,

One NH92W6002E2R318, serial number A168811-004, was received with a reported problem of not attaining its full stroke. The actuator pump was operational with no signal applied. When a signal was applied, the output shaft started to stroke, but appeared to intermittently stop and the pumping sound had ceased. The current draw by the motor was a maximum of 1.7 Amps which indicated that the motor was not in a locked rotor condition.

The pump/motor was activated with the controller removed. As the pressure increased, the rotor shaft was observed to stop turning, but the rotor core would spin on the shaft. This indicates to ASCO that there is an insufficient retention between the rotor shaft OD and the rotor core ID. As an enhanced detection method, a manual torque test has been added to the pump assembly procedures of all rotor assemblies to check for this condition. Pumps produced after 12/10/2010 will have an "R" etched into the top of the pump housing to indicate this inspection has been performed.

Going forward, ASCO has requested a root cause analysis and corrective action report from the supplier. Additional information will be supplied once the supplier's analysis has been completed.

If there are any further questions, please call me at 803-641-9395.

Sincerely,

Bob Arnone  
Technical Service Engineer

