

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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 FACIL: 50-305 Kewaunee Nuclear Power Plant, Wisconsin Public Service      05000305  
 AUTH. NAME      AUTHOR AFFILIATION  
 WEAVER, J.P.      Automatic Switch Co.  
 RECIPIENT NAME      RECIPIENT AFFILIATION  
 MURLEY, T.E.      Office of Nuclear Reactor Regulation, Director (Post 870411)

SUBJECT: Part 21 rept re potential failures of NP 8314 series valves.

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INTERNAL:	AEOD/DOA		1	1		AEOD/DSP/TPAB		1	1	
	ARM TECH ADV		1	1		NRR CRUTCHFIELD		1	1	
	NRR VARGA, S		1	1		NRR/DEST/ADE 8H		1	1	
	NRR/DEST/ADS 7E		1	1		NRR/DLPQ/QAB 10		1	1	
	NRR/DOEA/EAB 11		1	1		NRR/DOEA/GCB 11		1	1	
	NRR/DRIS/VIB 9D		1	1		NUDOCS-ABSTRACT		1	1	
	<del>REG FILE</del> 01		1	1		RES/DSIR DEPY		1	1	
	RES/DSIR/EIB		1	1		RGN1		1	1	
	RGN2		1	1		RGN3		1	1	
	RGN4		1	1		RGN5		1	1	
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October 18, 1988

United States Regulatory Commission  
Washington, DC 20555

Attention: Mr. Thomas E. Murley, Director  
Office of Nuclear Reactor Regulation

Reference: Potential Failures of NP8314 Series Valves

Dear Mr. Murley:

We enclose information relating to certain valves manufactured by Automatic Switch Company ("ASCO"). As you will see from the enclosed materials, it has been determined that these valves might malfunction under certain operation conditions. Some of these valves have been supplied for use in nuclear power facilities. Wisconsin Public Service Corporation has already reported to you concerning such a malfunction of these valves at their Kewaunee Nuclear Power Plant on May 28, 1988.

ASCO does not have adequate knowledge of the actual installation and operation conditions of these valves to determine whether their malfunction could create a "substantial safety hazard" as defined in 10 CFR 21.3, so that formal notification would be required by 10 CFR 21.21. We are likewise unable to conduct the evaluation necessary to make such a determination. Although ASCO is not obligated to submit formal notification pursuant to 10 CFR 21, we are reporting this information to you consistent with the provisions of 10 CFR 21.2, utilizing the relevant portions of the format set forth at 10 CFR 21.21.

As part of our ongoing dialogue with you concerning our valves and their use in nuclear facilities, ASCO will certainly cooperate with any further investigation that may be required. In the meantime, as the enclosed Service Bulletin reflects, we have notified the purchasers of these valves concerning their potential failure. Should you wish to discuss this further or obtain any additional information, please let us know.

Sincerely,

**AUTOMATIC SWITCH COMPANY**



James P. Weaver, Vice President  
Marketing & Product Development -  
Valve

**1. Name and address of the individual informing the Commission:**

Mr. James Weaver, Vice President  
Marketing and Product Development - Valve  
Automatic Switch Company  
Florham Park, NJ 07932

**2. Identification of the items supplied:**

ASCO NP8314 series solenoid operated valves manufactured by Automatic Switch Company.

**3. Nature of the failure and potential safety hazard:**

A lubricant known as P80 and made by International Products Corporation, Trenton, New Jersey, was used in the manufacture of a sub-assembly of NP8314 series solenoid valves. This lubricant is not necessary to the proper operation of the valve but merely facilitated assembly. The manufacturer of this lubricant represented that it would "disappear" shortly after application.

Although the sub-assembly was routinely cleaned following the use of his lubricant, ASCO has found that lubricant trapped within an internal cavity of this sub-assembly may not be fully removed. This lubricant may later migrate to a critical surface of the sub-assembly and solidify during long-term energization. Once solidified, the lubricant may cause internal portions of the valve mechanism to stick, thereby causing a failure of the ASCO NP8314 series valves to shift to the de-energized position.

**4. The location and number of all items supplied for facilities or activities subject to the regulations of the Commission:**

Appendix A hereto is a list of all NP8314 series solenoid valves and their purchasers. In some instances, the facility to which such valves may have been sent is unknown to ASCO. ASCO is contacting its customers to learn this information.

**5. The corrective action which is being taken:**

ASCO will supply a complete rebuild kit for each affected valve. Each kit will be accompanied by detailed instructions a copy of which is attached hereto as Appendix C.

The total quantity of NP8314 series valves supplied by ASCO is approximately 418. Based on all information available to ASCO at present, this potential failure is isolated to the ASCO NP8314 series valve exclusively. NP8314 constructions with all metal seating (indicated by an "L" suffix in the catalog number) could not contain this lubricant and are, therefore, not suspect. ASCO has already eliminated the suspect lubricant from its manufacturing process.

5. -continued-

ASCO has prepared a Service Bulletin (attached as Appendix B) in order to notify its customers of the potential failure of the NP8314 series valves.

Where necessary, ASCO will supply a new valve, if a rebuild is impractical or insufficient. The valve may be returned to ASCO and rebuilt, if necessary. All of the above is at no charge or cost to the license.

/mm

NP 8314 RECALL-PRELIMINARY CUSTOMER LIST

CATALOG NO.	VOLT.	QTY	SOLD TO	SHIPPED TO	DATE SHPD.
** COMMONWEALTH EDISON CO.					
NP8314C28	V 125/DC	38	FRED S. HICKEY	COMMONWEALTH EDISON CO.	ZION STATION UNITS 1 & 2 05/27/83
NP8314C28	V 125/DC	8	FRED S. HICKEY	COMMONWEALTH EDISON CO.	ZION GENERATING STATION 10/23/84
NP8314C62	V 120/60	4	FRED S. HICKEY	COMMONWEALTH EDISON CO.	DRESDEN STATION, UNITS 2 & 3 10/14/83
K218503		20	FRED S. HICKEY	COMMONWEALTH EDISON CO.	ZION GENERATING STATION 03/30/88
K218503		16	FRED S. HICKEY	COMMONWEALTH EDISON CO.	ZION GENERATING STATION 05/13/88
** Subtotal **		86			
** CONSOLIDATED EDISON (CORTLANDT WHSE)					
NP8314C13	V 125/DC	6	JOHN N. FEHLINGER	CONSOLIDATED EDISON (CORTLANDT WHSE)	10/15/87
** Subtotal **		6			
** FRANKLIN RESEARCH CENTER					
NP8314C29	E 125/DC	9	IVES EQUIPMENT	FRANKLIN RESEARCH CENTER	04/07/86
** Subtotal **		9			
** GPU NUCLEAR CORP					
K218481		2	IVES EQUIPMENT	GPU NUCLEAR CORP	TMI NUCLEAR STATION 03/10/86
NP8314C13	E 125/DC	1	IVES EQUIPMENT	GPU NUCLEAR CORP	TMI NUCLEAR STATION 07/31/85
NP8314C14	V 125/DC	1	IVES EQUIPMENT	GPU NUCLEAR CORP	OYSTER CREEK NUCLEAR STATION 05/28/86
NPL8314C29	V 125/DC	6	IVES EQUIPMENT	GPU NUCLEAR CORP	OYSTER CREEK NUCLEAR STATION 11/30/87
K218499		2	TRI-STATE TECH	GPU NUCLEAR CORP	OYSTER CREEK NUCLEAR STATION 09/24/84
K218499		1	TRI-STATE TECH	GPU NUCLEAR CORP	OYSTER CREEK NUCLEAR STATION 11/29/83
K218505		1	TRI-STATE TECH	GPU NUCLEAR CORP	OYSTER CREEK NUCLEAR STATION 11/29/83
NP8314C14	V 120/60	2	TRI-STATE TECH	GPU NUCLEAR CORP	07/13/88
NP8314C29	V 120/60	1	TRI-STATE TECH	GPU NUCLEAR CORP	09/26/83
NPL8314C29	V 120/60	4	TRI-STATE TECH	GPU NUCLEAR CORP	OYSTER CREEK NUCLEAR STATION 02/20/86

NP 8314 RECALL-PRELIMINARY CUSTOMER LIST

CATALOG NO.	VOLT.	QTY	SOLD TO	SHIPPED TO	DATE SHPD.
** Subtotal **					
		21			
** INDUSTRIAL SUPPLY CORP.					
NP8314C13	E 125/DC	2	INDUSTRIAL	INDUSTRIAL SUPPLY CORP.	09/28/83
** Subtotal **					
		2			
** JONES & AUERBACHER					
K218481		8	JONES & AUERBACHER	JONES & AUERBACHER	01/03/85
K218481		12	JONES & AUERBACHER	JONES & AUERBACHER	06/20/85
NP8314C13	E 125/DC	3	JONES & AUERBACHER	JONES & AUERBACHER	09/23/86
NP8314C13	E 125/DC	7	JONES & AUERBACHER	JONES & AUERBACHER	10/06/87
NP8314C13	E 125/DC	3	JONES & AUERBACHER	JONES & AUERBACHER	07/01/83
NP8314C13	E 125/DC	4	JONES & AUERBACHER	JONES & AUERBACHER	06/03/86
NP8314C13	E 125/DC	4	JONES & AUERBACHER	JONES & AUERBACHER	06/03/86
NP8314C13	E 125/DC	7	JONES & AUERBACHER	JONES & AUERBACHER	09/19/84
NP8314C13	E 125/DC	8	JONES & AUERBACHER	JONES & AUERBACHER	01/08/85
NP8314C13	E 125/DC	4	JONES & AUERBACHER	JONES & AUERBACHER	08/21/86
NP8314C13	E 125/DC	4	JONES & AUERBACHER	JONES & AUERBACHER	08/05/86
NP8314C13	E 125/DC	3	JONES & AUERBACHER	JONES & AUERBACHER	08/05/86
NP8314C13	E 125/DC	8	JONES & AUERBACHER	JONES & AUERBACHER	09/12/85
NP8314C13	E 125/DC	3	JONES & AUERBACHER	JONES & AUERBACHER	01/21/88
NP8314C13	V 125/DC	2	JONES & AUERBACHER	JONES & AUERBACHER	09/13/88
** Subtotal **					
		80			
** KEROTEST MFG. CORP.					
NPX8314C28	E 120/60	4	KEROTEST	KEROTEST MFG. CORP.	06/10/86
NP8314C28	E 120/60	1	KEROTEST	KEROTEST MFG. CORP.	02/01/88

NP 8314 RECALL-PRELIMINARY CUSTOMER LIST

CATALOG NO.	VOLT.	QTY	SOLD TO	SHIPPED TO	DATE SHPD.
** Subtotal **					
		5			
** N.Y. POWER AUTHORITY					
NPLX8314C13	V 125/DC	12	CONNECTICUT	N.Y. POWER AUTHORITY	INDIAN PT. NO. 3 NUCLEAR PLANT 03/04/86
NPLX8314C13	V 125/DC	20	CONNECTICUT	N.Y. POWER AUTHORITY	INDIAN PT. NO. 3 NUCLEAR PLANT 04/08/86
** Subtotal **					
		32			
** NIAGARA MOHAWK POWER CO.					
NP8314C29	E 125/DC	2	BURNS BROS.	NIAGARA MOHAWK POWER CO.	NINE MILE PT. NUCLEAR STATION, UNIT NO.1 10/26/81
** Subtotal **					
		2			
** OMAHA PUBLIC POWER DISTRICT					
NP8314C29	E 120/60	1	JOHN DAY	OMAHA PUBLIC POWER DISTRICT	FORT CALHOUN PLANT 10/01/81
NP8314C29	E 125/DC	4	JOHN DAY	OMAHA PUBLIC POWER DISTRICT	FORT CALHOUN STATION 09/30/81
NP8314C29	E 125/DC	70	JOHN DAY	OMAHA PUBLIC POWER DISTRICT	FORT CALHOUN STATION 09/29/81
NP8314C29	E 125/DC	4	JOHN DAY	OMAHA PUBLIC POWER DISTRICT	FORT CALHOUN STATION 10/05/81
** Subtotal **					
		79			
** PACIFIC GAS & ELECTRIC					
K218481		2	ASSOCIATED	PACIFIC GAS & ELECTRIC	GENERAL CONSTRUCTION 07/02/84
NP8314C13	E 125/DC	1	ASSOCIATED	PACIFIC GAS & ELECTRIC	DIABLO CANYON SITE 01/24/84
** Subtotal **					
		3			
** SIMONE ENGINEERING					
NP8314C13	E 125/DC	3	SIMONE ENGINEERING	SIMONE ENGINEERING	07/01/83

NP 8314 RECALL-PRELIMINARY CUSTOMER LIST

CATALOG NO.	VOLT.	QTY	SOLD TO	SHIPPED TO	DATE SHPD.
** Subtotal **					
		3			
** TMI NUCLEAR GENERATING STATION 2					
NP8314C13	E 125/DC	2	MORRISTOWN	TMI NUCLEAR GENERATING STATION 2	03/24/82
** Subtotal **					
		2			
** VEPCO					
NP8314C13	E 125/DC	2	INDUSTRIAL	VEPCO	NORTH ANNA POWER STATION
** Subtotal **					
		2			
** WISCONSIN ELECTRIC POWER CO.					
K218481		6	SIMONE ENGINEERING	WISCONSIN ELECTRIC POWER CO.	POINT BEACH NUCLEAR PLANT
NP8314C13	V 125/DC	12	W.D. EHRKE	WISCONSIN ELECTRIC POWER CO.	POINT BEACH NUCLEAR PLANT
K218481		12	W.D. EHRKE	WISCONSIN ELECTRIC POWER CO.	POINT BEACH NUCLEAR PLANT
K218481		12	W.D. EHRKE	WISCONSIN ELECTRIC POWER CO.	POINT BEACH NUCLEAR PLANT
** Subtotal **					
		42			
** WISCONSIN PUBLIC SERVICE CORP.					
K218480		4	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
K218481		4	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
NP8314C13	E 125/DC	9	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
NP8314C13	E 120/60	2	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
NP8314C28	E 125/DC	3	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
NPL8316C28	E 125/DC	12	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
NPL8314C28	E 125/DC	2	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT
NPL8314C28	E 125/DC	2	W.D. EHRKE	WISCONSIN PUBLIC SERVICE CORP.	KEWAUNEE NUCLEAR PLANT



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10/17/88

NP 8314 RECALL-PRELIMINARY CUSTOMER LIST

CATALOG NO.	VOLT.	QTY	SOLD TO	SHIPPED TO	DATE SHPD.
** Subtotal **		38			
** XOMOX CORP. NP8314C28	E 120/60	6	XOMOX CORP.	XOMOX CORP.	09/07/88
** Subtotal **		6			
*** Total ***		418			

The ASCO logo is a square with a dark, textured background. The word "ASCO" is written in a bold, white, sans-serif font, centered within the square.

## SERVICE BULLETIN

The ASCO logo is a square with a dark, textured background. The word "ASCO" is written in a bold, white, sans-serif font, centered within the square.

Based on the results of an investigation conducted by Automatic Switch Company (ASCO) in cooperation with a nuclear power plant in an attempt to determine the possible cause of ASCO series NP8314 solenoid valve failures, ASCO has concluded that there is a possibility other ASCO NP8314 series solenoid valves installed in nuclear power plants may fail to shift to their de-energized position following long periods of energization. Since ASCO has little knowledge of the specific applications of the NP8314 series valves, the end users (licensees) must determine if this potential problem represents a potential safety hazard requiring evaluation or notification pursuant to 10CFR21.

The valves that failed at the nuclear power plant are ASCO Model NPL8314C28E, 125/DC solenoid operated valves, and are part of a group of 12 valves manufactured by ASCO. According to the information supplied to us by the plant, 10 of the solenoid valves were installed in mid-march of 1988, and were put into service upon start-up of the plant in early April. Three of the valves were maintained energized and the other seven were maintained de-energized while in service. As communicated to ASCO by the plant, at the first attempt to de-energize the three energized valves, all three failed to shift. All three normally energized valves, plus one of the seven normally de-energized valves installed at the plant were replaced in June, 1988, and system modifications were made to allow all 10 valves to maintain a normally de-energized position.

This ASCO investigation, and a recently completed chemical analysis conducted by an independent laboratory, indicate a high probability that the cause of the failures at the plant is a lubricant used in the manufacture of a sub-assembly of the failed valves. Although the sub-assembly was routinely cleaned following the use of this lubricant, we have found that the lubricant, trapped within an internal cavity of this sub-assembly, may not be fully removed. This lubricant can later migrate to a critical surface of this sub-assembly and solidify following long term energization. Once solidified, the lubricant may cause portions of the sub-assembly to stick, thereby causing failure of the ASCO NP8314 series valves to shift to the de-energized position.

This lubricant may be present in other ASCO NP8314 series valves supplied to other utilities and nuclear equipment vendors. The total quantity of NP8314 series valves and rebuild kits for series NP8314 valves supplied by ASCO is approximately 418. Based

October 17, 1988

on all information available to ASCO at this time, this potential problem is isolated to the ASCO NP8314 series valve exclusively. NP8314 constructions with all metal seating (indicated by an "L" suffix in the catalog number) could not contain this lubricant and are, therefore, not suspect. ASCO has already eliminated the suspect lubricant from its manufacturing process.

We will offer rebuild kits with complete instructions or, if necessary, replacement valves to satisfy your needs. Technical assistance will also be available on request.

AUTOMATIC SWITCH COMPANY

A. Gregory Byrne  
Valve Service Manager

AGB:jdm

# INSTALLATION AND MAINTENANCE INSTRUCTIONS

## 3-WAY NUCLEAR POWER SOLENOID-OPERATED PILOT VALVES

### NORMALLY CLOSED, NORMALLY OPEN AND UNIVERSAL OPERATION.

#### 1/4 NPT - 3/32 AND 3/64 ORIFICES

#### INSTRUMENT AIR SERVICE

BULLETIN

8314

ASCO

Form No. V6218

### DESCRIPTION

Bulletin 8314 valves with Prefix "NP" in the catalog number are 3-way, nuclear power plant solenoid-operated pilot valves with bodies of rugged brass construction. Valves are available with resilient or metal-to-metal lower seating depending upon requirements. The upper seating is always metal-to-metal. Valve elastomers are of ethylene propylene (Suffix "E") for oil-free or VITON\* (Suffix "V") for non-oil-free instrument air service. Valves are equipped with an explosion-proof/watertight solenoid enclosure which is designed to meet NEMA Type 4 - Watertight, NEMA Type 7 (C or D) Hazardous Locations - Class I, Groups C or D, and NEMA Type 9 (E, F or G) Hazardous Locations - Class II, Groups E, F or G.

### OPERATION

**Normally Closed** (Pressure at "2".)

Solenoid De-energized: Flow is from Connection "1" to Connection "3". Connection "2" is closed.

Solenoid Energized: Flow is from Connection "2" to Connection "1". Connection "3" is closed.

**Normally Open** (Pressure at "3".)

Solenoid De-energized: Flow is from Connection "3" to Connection "1". Connection "2" is closed.

Solenoid Energized: Flow is from Connection "1" to Connection "2". Connection "3" is closed.

**Universal** (Pressure at "2" or "3" only.)

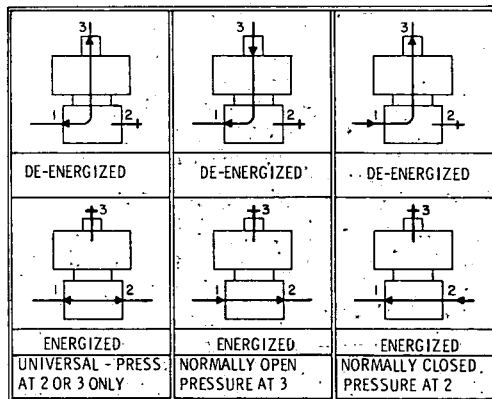
Solenoid De-energized: Flow is from Connection "1" to Connection "3" or from Connection "3" to Connection "1". Connection "2" is closed.

Solenoid Energized: Flow is from Connection "1" to Connection "2" or from Connection "2" to Connection "1". Connection "3" is closed.

Note: Connection marking "1" corresponds directly with Connection marking "1".

**IMPORTANT:** No minimum operating pressure differential required.

FLOW DIAGRAM



### INSTALLATION

Check nameplate for correct catalog number, pressure, voltage and service.

#### POSITIONING

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertical and upright so as to reduce the possibility of foreign matter accumulating in the core tube area.

#### MOUNTING

For valve body mounting dimensions, refer to Figure 1.

#### PIPING

Connect piping or tubing to valve according to markings on valve body. Refer to flow diagrams provided. **CAUTION:** Valves supplied for oil-free instrument air service are equipped with ethylene propylene elastomers which can be attacked by oils and greases. Wipe the pipe threads clean of cutting oils. This precaution does not apply to valves with Viton elastomers (Suffix "V" in catalog numbers). Piping to all valve ports should be oriented such that any accumulated moisture (particularly LOCA chemical spray) will not enter the internal areas of the valve. For applications where exhaust piping is not required, install a downward-directed street elbow in the valve exhaust port. Pipe strain on valve body should be avoided by proper support and alignment of piping. When tightening connections, do not use valve body or solenoid as a lever. Wrenches applied to valve body or piping are to be located as close as possible to connection point.

**IMPORTANT:** For the protection of the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Periodic cleaning is required depending on service conditions. See Bulletins 8600 and 8601 for strainers.

\*DuPont's registered trademark.

As an additional precaution against malfunction on start-up, resulting from large particles of pipe scale, weld splatter, or other debris in pipe line, these valves have a large-mesh screen (not a filter) at inlet. This screen is not a substitute for the strainers or filters recommended above, whose function is to provide continuous straining or filtration of the line fluid.

#### WIRING

Wiring must comply with all applicable Local and National Electrical Codes. Housings are provided with a 1/2 or 3/4 NPT conduit connection. Connect wiring through conduit of suitable quality for the expected environment to a vented electrical junction box located in the same area as the valve. The conduit/junction box system should be oriented such that any accumulated moisture or LOCA spray will not run into the solenoid enclosure. The explosion-proof/watertight solenoid enclosure may be rotated to facilitate wiring by loosening the pipe adapter and housing cover. Two wrenching flats are provided on the housing to hold it securely in place while loosening or tightening pipe adapter and housing cover. Rotate solenoid enclosure to desired position and tighten housing cover and pipe adapter. Torque housing cover to  $135 \pm 15$  inch-pounds [ $15.3 \pm 1.7$  newton meters]. Torque pipe adapter to  $30 \pm 5$  inch-pounds [ $3.4 \pm 0.6$  newton meters].

**NOTE:** Alternating Current (A-C) and Direct Current (D-C) solenoids are built differently. To convert from one to the other, it is necessary to change the solenoid and internal parts. Consult ASCO.

#### SOLENOID TEMPERATURE

Standard catalog valves are supplied with coils designed for continuous-duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the hand only for an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

#### MAINTENANCE

**WARNING:** Turn off electrical power supply and depressurize valve before making repairs. It is not necessary to remove the valve from the pipe line for repairs. However, piping or tubing must be removed from Connection 3.

#### CLEANING

A periodic cleaning of all solenoid valves is desirable. The time between cleanings will vary depending on medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean valve strainer or filter when cleaning solenoid valve.

#### PREVENTIVE MAINTENANCE

1. Keep the medium flowing through the valve as free from dirt and foreign material as possible. Use instrument quality air, oil-free for Suffix "E".
2. While in service, operate valve periodically to insure proper opening and closing.
3. Periodic inspection (depending upon medium and service conditions) of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any parts that are worn or damaged.
4. The valves may require periodic replacement of the coil and all resilient parts during their installed life to maintain qualification. The exact replacement period will depend on ambient and service conditions. Spare Parts Kits and Coils are ordered separately. See Ordering Information. Consult ASCO for specific recommendations in connection with the replacement of parts.

#### IMPROPER OPERATION

1. **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic click signifies solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown-out fuses, open-circuited or grounded coil, broken lead wires or splice connections.
2. **Burned-Out Coil:** Check for open-circuited coil. Replace coil if necessary.
3. **Low Voltage:** Check voltage across the coil leads. Voltage must be at least 85% of nameplate rating for A-C and non-battery-operated D-C valves. Voltage must be at least 72% of nameplate rating for battery-operated D-C valves.
4. **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
5. **Excessive Leakage:** Disassemble valve and clean all parts. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

#### COIL REPLACEMENT (Refer to Figure 2.)

Depressurize valve and turn off electrical power supply. Disconnect coil lead wires and piping from Connection "3". Proceed in the following manner:

1. Unscrew pipe adapter from top of solenoid enclosure.
2. Unscrew housing cover with nameplate and retaining ring attached. Two wrenching flats are provided on the housing to hold it securely in place while housing cover is being removed or replaced.
3. Remove flux washer, spring washer, insulating washers (2), coil and insulating washer. Insulating washers are omitted when a molded coil is used.

ASCO Valves

ASCO

4. Before reassembly, refer to note below for torquing requirements.
5. Reassemble in reverse order of disassembly, paying careful attention to exploded view provided for identification and placement of parts.
6. Torque housing cover to  $135 \pm 15$  inch-pounds [ $15,3 \pm 1,7$  newton meters].
7. Torque pipe adapter to  $30 \pm 5$  inch-pounds [ $3,4 \pm 0,6$  newton meters].
8. Make up tubing or piping to Connection 3 and electrical hookup.

**CAUTION:** Solenoid must be fully reassembled, as the housing and internal parts are part of and complete the magnetic circuit.

**NOTE:** Installation and maintenance of explosion-proof equipment requires more than ordinary care to insure safe performance. All finished surfaces of the solenoid are constructed to provide a flame-proof seal. Be sure that the surfaces are wiped clean before replacing. If watertight, as well as explosion-proof is a requirement, grease the joints of the explosion-proof/watertight solenoid enclosure with DOW CORNING® 111 Compound lubricant or an equivalent high-grade silicone grease. Grease the joints thoroughly covering all surfaces, including the top surface of the flux washer and the threaded portion of the pipe adapter.

**CAUTION:** Do not use this lubricant on any moving parts of the valve.

#### VALVE DISASSEMBLY (Refer to Figures 2 or 3.)

Depressurize valve and turn off electrical power supply. Disconnect coil lead wires, conduit connection and piping from Connection "3". Disassemble valve in an orderly fashion, paying careful attention to exploded view provided for identification and placement of parts.

1. Unscrew pipe adapter (with plugnut gasket inside) from top of solenoid enclosure.
2. Unscrew housing cover with retaining ring and nameplate attached. Two wrenching flats are provided on the housing to hold it securely in place while housing cover is being removed or replaced.
3. Remove flux washer; plugnut gasket from pipe adapter, spring washer, insulating washers (2), coil and insulating washer from the solenoid base sub-assembly.
4. Unscrew solenoid base sub-assembly with special wrench adapter supplied in Spare Parts Kit (Wrench Kit Order No. 218-949).

**CAUTION:** Install all parts supplied in Spare Parts Kit. Do not retain any old valve parts. The parts supplied are mated and cannot be interchanged with other individual valve parts or with other Spare Parts Kits.

5. Remove solenoid base sub-assembly, housing, body gasket, core assembly, core spring and core guide. **NOTE:** Core guide not present on all constructions.
6. For valve constructions with metal-to-metal seating (Figure 3), remove valve seat using a 7/16 socket wrench.
7. All parts are now accessible for cleaning or replacement. Clean all parts and passageways thoroughly before valve reassembly. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

#### VALVE REASSEMBLY

1. Reassemble in reverse order of disassembly, paying careful attention to exploded view provided for identification and placement of parts.
2. Lubricate body gasket and plugnut gasket with DOW CORNING® 550 Fluid lubricant (supplied in Spare Parts Kit).
3. Refer to Note under "Coil Replacement" for solenoid enclosure greasing requirements.
4. For valve constructions with metal-to-metal seating, install valve seat using a small amount of pipe sealing compound on the seat threads to avoid possible leakage. Torque valve seat to  $40 \pm 5$  inch-pounds [ $4,5 \pm 0,6$  newton meters].
5. Install body gasket in valve body.
6. Position solenoid base sub-assembly in solenoid housing and install core assembly, core spring and core guide, if present.
7. Install solenoid base sub-assembly into the valve body, using special wrench adapter provided in Spare Parts Kit. Torque solenoid base sub-assembly to  $175 \pm 25$  inch-pounds [ $19,8 \pm 2,8$  newton meters].
8. Replace insulating washer, coil, insulating washers (2), flux washer, spring washer and plugnut gasket over the solenoid base sub-assembly.
9. Replace housing cover with nameplate and retaining ring. Torque housing cover to  $135 \pm 15$  inch-pounds [ $15,3 \pm 1,7$  newton meters].
10. Replace pipe adapter and torque to  $30 \pm 5$  inch-pounds [ $3,4 \pm 0,6$  newton meters].
11. Make up tubing or piping to Connection "3" and electrical hookup to coil.
12. After maintenance, operate the valve a few times to be sure of proper operation. A metallic click signifies the solenoid is operating.

#### SPARE PARTS KITS

Spare Parts Kits and Coils are available for ASCO valves. Parts marked with an asterisk (\*) are supplied in Spare Parts Kits.

#### ORDERING INFORMATION FOR SPARE PARTS KITS

When Ordering Spare Parts Kits or Coils, Specify Valve Catalog Number, Serial Number, Voltage and Hertz A-C, or Voltage D-C.

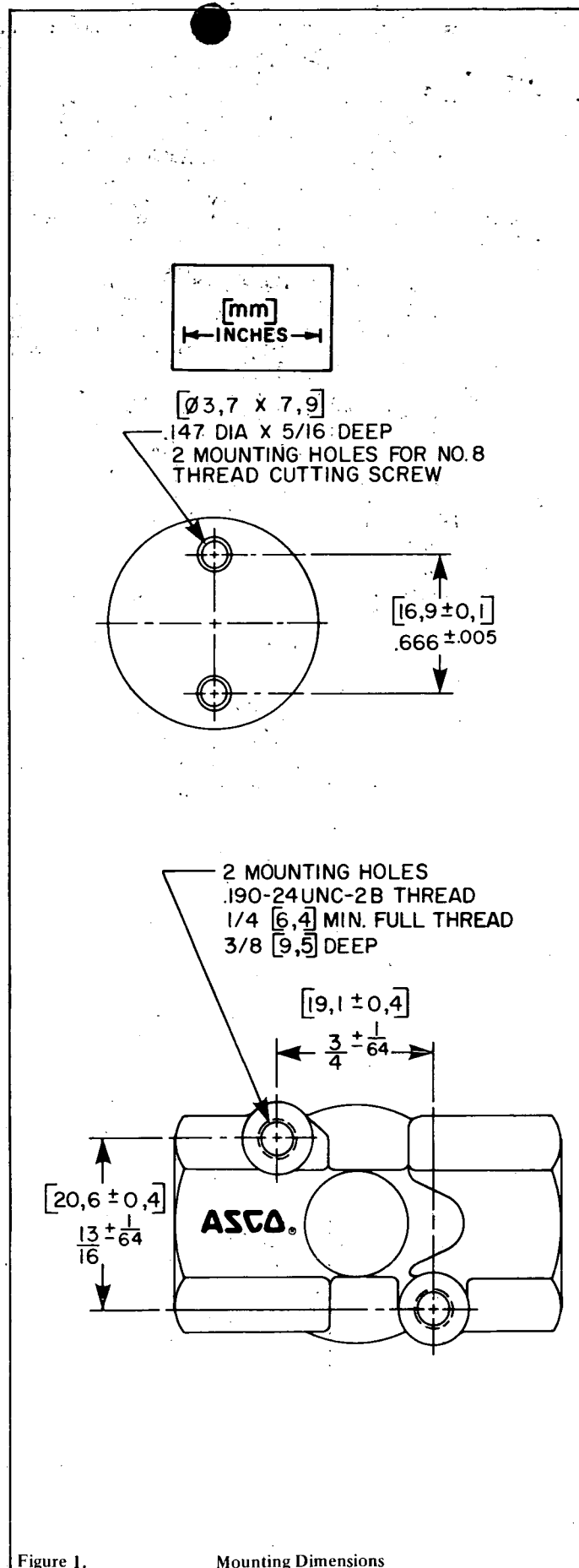


Figure 1. Mounting Dimensions

TORQUE CHART		
PART NAME	TORQUE VALUE INCH-POUNDS	TORQUE VALUE NEWTON METERS
Pipe Adapter	30 ± 5	3,4 ± 0,6
Housing Cover	135 ± 15	15,3 ± 1,7
Solenoid Base Sub-Assembly	175 ± 25	19,8 ± 2,8

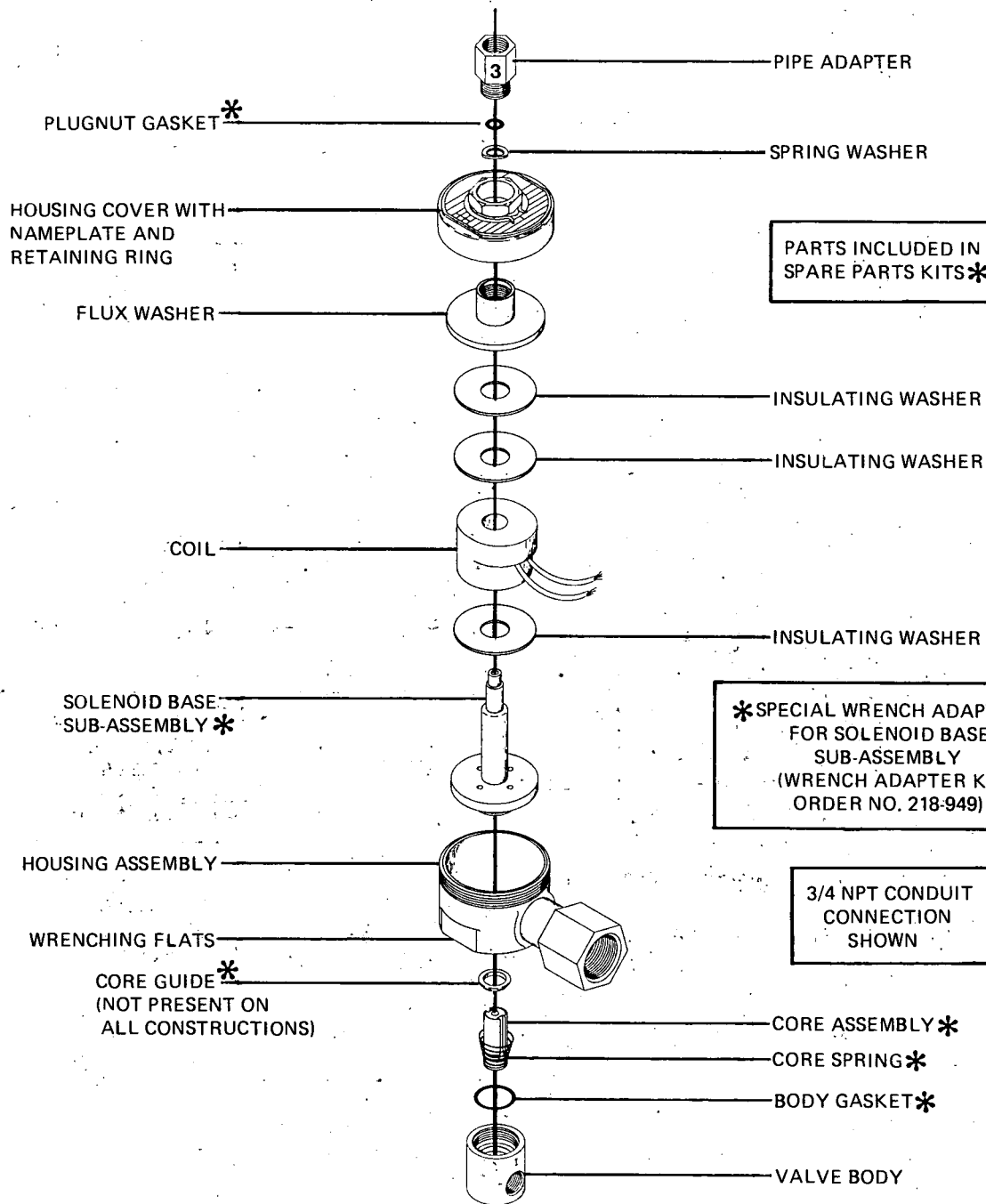


Figure 2.

Bulletin 8314 - Resilient Seating  
1/4 NPT - A-C (Alternating Current) Construction

TORQUE CHART		
PART NAME	TORQUE VALUE INCH-POUNDS	TORQUE VALUE NEWTON METERS
Pipe Adapter	30 ± 5	3,4 ± 0,6
Housing Cover	135 ± 15	15,3 ± 1,7
Solenoid Base Sub-Assembly	175 ± 25	19,8 ± 2,8
Valve Seat	40 ± 5	4,5 ± 0,6

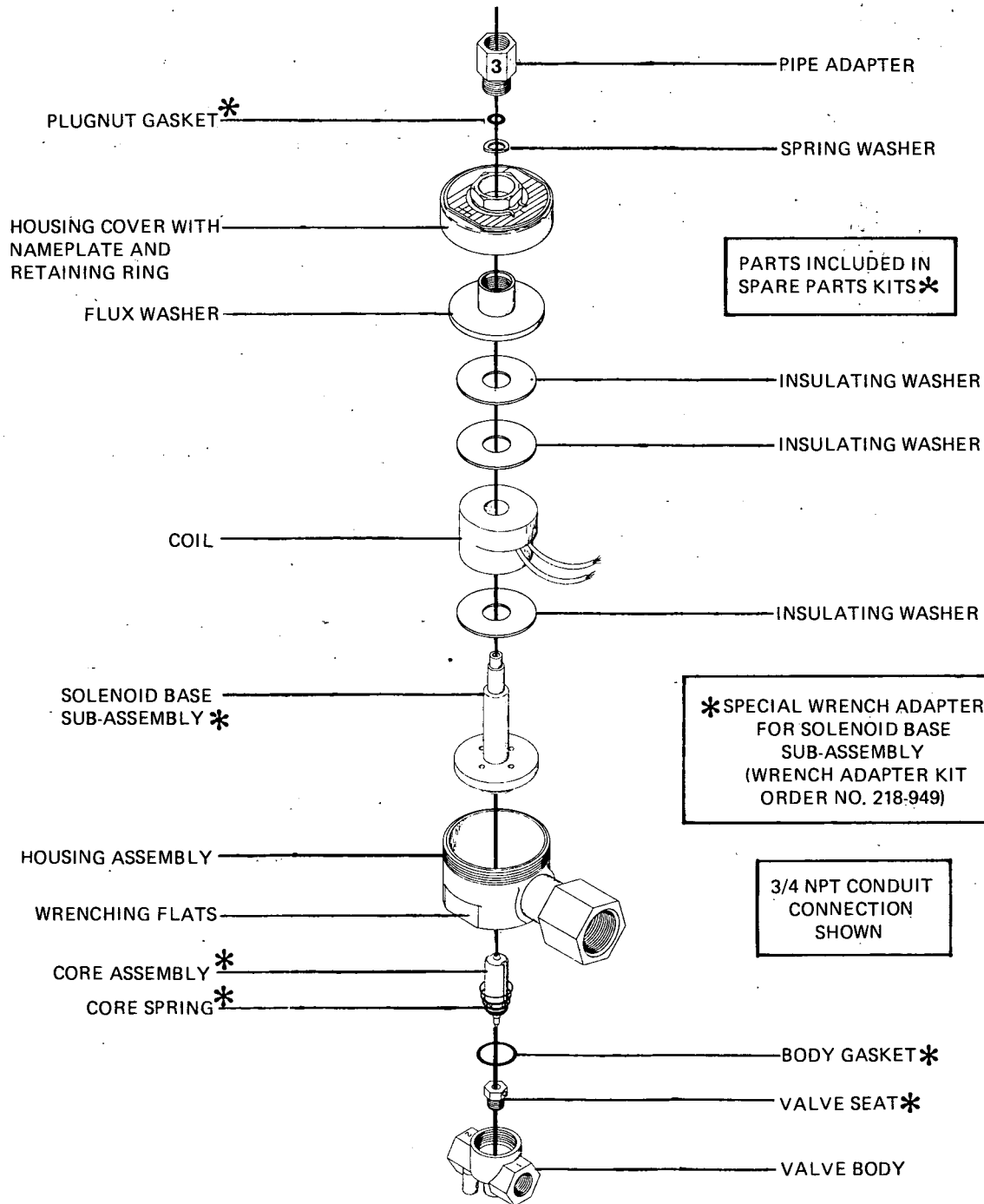


Figure 3. Bulletin 8314 - Metal-to-Metal Seating  
1/4 NPT - A-C (Alternating Current) Construction