

---

---

## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 477-8589  
SRP Section: 09.03.01 - Compressed Air System  
Application Section: 9.3.1  
Date of RAI Issue: 05/09/2016

---

### **Question No. 09.03.01-6**

In RAI 87-7993 question 9.3.1-1, the staff requested the applicant to justify the use of a standard that has not been endorsed by the NRC. The applicant's response states that the new standard incorporates the guidance from the old standard; therefore, the new standard is the appropriate guidance.

The staff evaluated the applicant's response and determined that this justification does not address the staff concerns. The NRC reviews and endorses guidances independently from industry groups. In some cases the guidance is endorsed, in others the guidance may be endorsed with exceptions, clarifications, and/or limitations. In other circumstances, the guidance may not be endorsed by the NRC staff.

For instrument air quality, SRP Section 9.3.1, Revision 3, endorses the use of ANSI/ISA S7.3 R , "Quality Standard for Instrument Air." The use of any other standard would be evaluated on a case by case basis and would severely impact the review schedule. As discussed in RAI 87-7993 question 9.3.1-1, the guidance proposed by the applicant includes relaxation on the maximum allowed particulate size and the maximum pressure dew point.

The staff requests the applicant to update the DCD to reflect how the compress air system design conforms with the staff's approved air quality standard.

### **Response**

To be consistent with the air quality requirements in the guidance identified in the current SRP 9.3.1, DCD Tier2, Table 3.2-1 (35 of 86), Section 9.3.1.1.b.6, Section 9.3.1.2.1.1, Section 9.3.1.3, Section 9.3.1.4 and Section 9.3.6 will be revised.

---

**Impact on DCD**

DCD Tier 2, Table 3.2-1 (35 of 86), Section 9.3.1.1.b.6, Section 9.3.1.2.1.1, Section 9.3.1.3, Section 9.3.1.4 and Section 9.3.6 will be revised as shown in the Attachment.

**Impact on PRA**

There is no impact on the PRA.

**Impact on Technical Specifications**

There is no impact on the Technical Specifications.

**Impact on Technical/Topical/Environmental Reports**

There is no impact on any Technical, Topical, or Environmental Report.

APR1400 DCD TIER 2

RAI 72-8020 Question 03.02.02-5\_Rev.1

RAI 477-8589 Question 09.03.01-6

Table 3.2-1 (35 of 86)


Item No. / Principal SSCs SSC Identification	Location <sup>(2)</sup>	Safety Class	Quality Group	Codes and Standards	10 CFR 50, App. B <sup>(3)</sup>	Seismic Category	Remarks
46. HT – Heat Tracing							
a. Equipment in safety-related areas							
1) Heat tracing panel	AB	NNS	N/A	IEEE 622-1987, IEEE 515-2004, IEEE 622A-1986, IEEE 622B-1988	A	II	(3)(d)
2) Distribution transformer	AB	NNS	N/A	N/A	A	II	(3)(d)
b. Others	TGB, CPB, Yard	NNS	N/A	IEEE 622-1987, IEEE 515-2004, IEEE 622A-1986, IEEE 622B-1988	N/A	III	
47. IA – Instrument Air							
a. Containment <del>isolation</del> isolation valves and associated piping	AB, RCB	SC-2	B	ASME Sec. III NC-2007 with 2008 addenda	Yes	I	
b. Non-safety-related piping and equipment in safety-related areas	AB	NNS	D	ASME B31.1-2010	A	II	(3)(d)
c. Air compressor and auxiliaries	TGB	NNS	D	<del>ISA S7.0.01-1996</del> N/A	<del>A</del> N/A	III	<del>(3)(e)</del>
d. Piping in non-safety-related areas	TGB	NNS	D	N/A	N/A	III	
e. Others	TGB	NNS	D	N/A	N/A	III	

03.02.02-5

03.02.02-5

ISA S7.3-1975(R1981)

**APR1400 DCD TIER 2**

- 5) The CAS is designed for one unit and is not shared with other units.
- 6) The IAS meets the air quality requirements of ~~ISA 7.0.01~~ (Reference 2) to supply clean, dry, oil-free instrument air. 
- c. The compressed gas system is composed of the nitrogen subsystem, hydrogen subsystem, and carbon dioxide subsystem.
- d. The breathing air system supplies emergency breathing air for control room personnel. Breathing air is Grade D respiratory quality air, as defined in ANSI/CGA G-7.1 (Reference 12).

### 9.3.1.2 System Description

#### 9.3.1.2.1 General Description

##### 9.3.1.2.1.1 Instrument Air System



The IAS supplies clean, oil-free, dry air in accordance with ~~ISA 7.0.01~~ to air-operated valves, pneumatic instrumentations and controls, and air-operated control dampers throughout the plant.

The IAS consists of two redundant and independent sets of equipment. A cross-connecting line with a normally closed valve is provided between the two redundant air lines. Each line consists of one 100 percent capacity air compressor, one 100 percent air receiver, one 150 percent set of air dryers, one 150 percent air filtering unit and related instruments and controls, and air supply piping and valves that are located in the turbine generator building. Provisions to cross connect the IAS and SAS are installed at the distribution header upstream of the dryers. In event that the instrument air compressors cannot meet the demand for instrument air, the service air compressor provides a backup supply of air. Isolation valve and check valves are provided on the cross-connect to permit isolation of the systems. An independent closed loop cooling system is provided with to air compressors. The closed loop cooling system consists of one pump, one surge tank, one cooling tower, related instruments and controls. The location of major components in the turbine building minimizes the likelihood of leakage from radioactive systems to be

**APR1400 DCD TIER 2**

dampener, main steam isolation valves, main feedwater isolation valves, main steam isolation valves bypass valves, and main steam atmospheric dump valves. The low pressure nitrogen gas subsystem provides low pressure nitrogen to the various users throughout the plant.

**9.3.1.2.2.4 Breathing Air System**

The breathing air system supplies respiratory air for the control room personnel when the control room air is contaminated with toxic chemicals or airborne radioactivity. The system provides the portable respiratory air units to be used by the MCR personnel for emergency evacuation, and by the damage control team while working in the contaminated area.

**9.3.1.3 Safety Evaluation**

The compressed air and gas systems are non-safety-related systems with the exception of the containment isolation portion, which is described in Subsection 6.2.4. No safety evaluation is required.

A loss of instrument air during an accident or SBO causes all pneumatically operated safety-related valves and control dampers served by the IAS to fail in the safe position. However, each auxiliary feedwater turbine steam supply valve has an air accumulator with two cycles of minimum capacity as backup compressed air to perform its safety-related function on loss of instrument air pressure. Therefore, failure of the IAS does not affect any safe shutdown or accident mitigation function and also does not cause degradation of barriers to radiation releases during normal operation.

The IAS is designed to produce the quality of air, as stipulated in ~~ISA 7.0.01~~. 

Provisions to cross connect the IAS and SAS are installed at the distribution header upstream of the dryers. In event that the instrument air compressors cannot meet the demand for instrument air, the service air compressor provides a backup supply of air.

The compressed air and gas systems are not shared with other units, and the requirements of GDC 5 (Reference 3) are therefore not applicable.

**APR1400 DCD TIER 2****9.3.1.4 Inspection and Testing Requirements**

Preoperational testing is carried out as described in Section 14.2 to demonstrate that the compressed air and gas systems operate in accordance with applicable test programs and specifications.

Air compressors and associated components of the CAS on standby are checked and operated periodically. Air filters of the IAS are inspected for cleanliness, and the desiccant is changed when it no longer performs according to the manufacturer's specifications. The compressed air sample of the IAS is analyzed for moisture, air, and particulate content at each refueling outage to provide reasonable assurance that air quality meets the requirements of ~~ISA 7.0-01~~.

↖ ISA S7.3R

**9.3.1.5 Instrumentation Requirements**

Adequate instrumentation, including pressure elements, is provided to monitor the system operation and to present annunciation in the MCR and RSR whenever system pressure drops below the setpoint limit.

Air compressor status lights are also provided in the MCR and RSR to inform the operator of the status of air compressors. The outlet pressures of air receivers for CAS and afterfilters for IAS are indicated in MCR and RSR.

The instrumentation of air compressors and dryer packages includes locally mounted temperature and pressure switches, indicators, and automatic protection devices.

**9.3.2 Process and Post-Accident Sampling System**

The process and post-accident sampling system is designed to collect and deliver representative samples of liquids and gases in various process systems to various sample stations for chemical and radiological analysis. The system consists of the normal primary sampling system (NPSS), the post-accident sampling system (PASS), and the secondary sampling system (SSS) and permits sampling during normal operation, including shutdown cooling and post-accident modes without access to the containment. Samples in high radiation areas are taken remotely without access to these areas. Local grab sampling points, as listed in Table 9.3.2-1, are provided for various locations throughout the plant.

**APR1400 DCD TIER 2**

activity. The process radiation monitor serves only as a trending device to alert the operator of possible fuel cladding failure.

#### 9.3.4.5.6 Boronometer

The boronometer provides indication and a continuous recording in the MCR of reactor coolant boron concentration. High and low alarms warn the operator of deviations from the required boron concentration in the reactor coolant. The principle of operation is neutron absorption. The unit is provided with shielding as required to limit the maximum external radiation level from its source to a low value. All portions of the unit that contact reactor coolant are constructed of austenitic stainless steel. Refer to Subsection 7.7.1.1 for further information on the boron control system.

#### 9.3.5 Combined License Information

COL 9.3(1) The COL applicant is to prepare operational procedures and maintenance programs as related to leak detection and contamination control.

COL 9.3(2) The COL applicant is to maintain complete documentation of system design, construction, design modifications, field changes, and operations.

COL 9.3(3) The COL applicant is to prepare the site radiological environmental monitoring program.

COL 9.3(4) The COL applicant is to provide the supply systems of the nitrogen gas subsystem, the hydrogen subsystem, the carbon dioxide subsystem, and the breathing air systems.

#### 9.3.6 References

1. 10 CFR 50.63, "Station Blackout Rule," U.S. Nuclear Regulatory Commission.
2. ~~ANSI/ISA 7.0.01-1996, "Quality Standard for Instrument Air," International Society of Automation, 1996.~~

ANSI/ISA S7.3R, "Quality Standard for Instrument Air". International Society for Measurement and Control, 1975(R1981).