

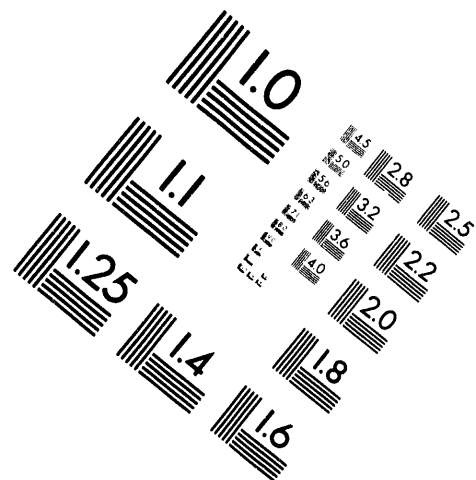
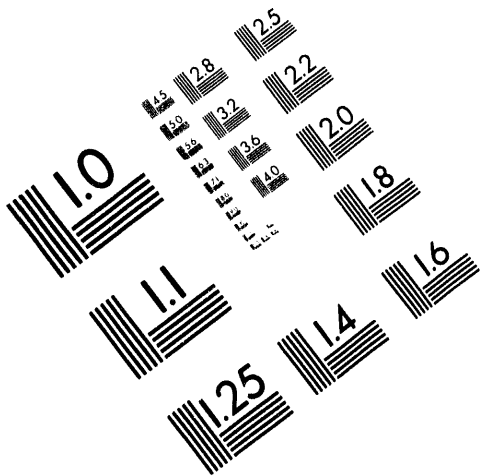


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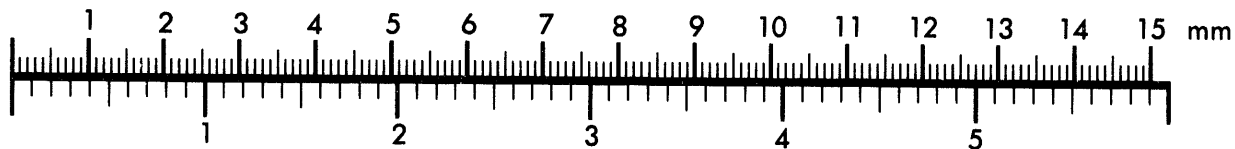
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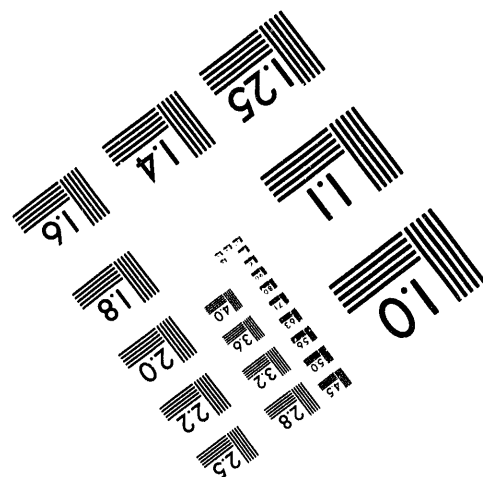
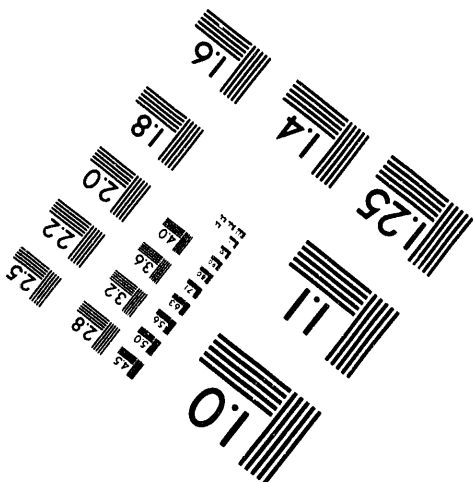
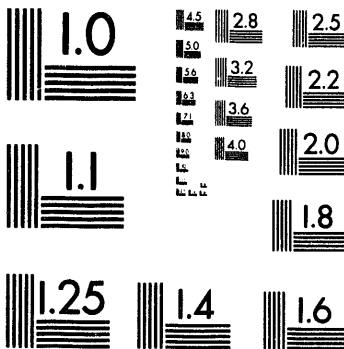
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An Example of A Component Replacement When Applying ASME N509 and ASME N510 to Older Ventilation Systems

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AN EXAMPLE OF A COMPONENT REPLACEMENT WHEN APPLYING
ASME N509 AND ASME N510 TO OLDER VENTILATION SYSTEMS

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Abstract

This paper presents an example of a component replacement (electric heater) when installed in an older ventilation system that was constructed before the issuance of ASME N509⁽¹⁾ and N510⁽²⁾. Many of the existing ventilation systems at the Hanford Site were designed, fabricated, and installed before the issuance of ASME N509⁽¹⁾ and N510⁽²⁾. Requiring the application of these codes to existing ventilation systems presents challenges to the engineer when design changes are needed.

Although it may seem that the application of ASME N509⁽¹⁾ or N510⁽²⁾ may be a hindrance at times, this does not need to occur. Proper preparation at the start of project or design modifications can minimize frustration to the engineer when it is judged that portions of ASME N509⁽¹⁾ and N510⁽²⁾ do not apply in a particular application.

I. Introduction

Westinghouse Hanford Company (WHC) must comply with the U.S. Department of Energy (DOE) Order 6430.1A, *General Design Criteria*⁽³⁾. The order states in part "These criteria apply to any building acquisition, new facility, facility addition and alteration, and leased facility that is required to comply with DOE Order 4300.1B⁽⁴⁾. This includes on-site constructed buildings, pre-engineered buildings, plant-fabricated modular buildings, and temporary facilities." DOE 6430.1A, Section 1550-2.5.5, titled "Air-Cleaning Devices," requires that all high-efficiency particulate air (HEPA) filtration systems comply with ASME N509⁽¹⁾ and be tested in accordance with ASME N510⁽²⁾.

In addition to DOE Order 6430.1A⁽³⁾ requiring ASME N509⁽¹⁾ and ASME N510⁽²⁾, RLIP 5480.4C⁽⁵⁾, titled *Environmental Protection, Safety, and Health Protection Standards for RL*, Section 10, "Nuclear Safety Standards," paragraph b, "Nuclear Facility Safety," also invokes ASME N509⁽¹⁾ and ASME N510⁽²⁾ as mandatory standards.

II. Existing Ventilation Systems

Many of the existing ventilation systems at the Hanford Site were designed, fabricated, and installed before the issuance of ASME N509⁽¹⁾ and N510⁽²⁾. Requiring the application of ASME N509⁽¹⁾ and N510⁽²⁾ to existing ventilation systems presents challenges to the engineer when design changes are needed.

The following example will attempt to illustrate complications that are encountered when applying ASME N509⁽¹⁾ and N510⁽²⁾ to older ventilation systems that were constructed before the issuance of these codes.

Replacement of a Steam Heater with an Electric Heater

ASME N509, paragraph 5.5, states "Heaters shall be electric and capable of meeting the requirements of paragraph 4.5 of this standard."⁽¹⁾

Many of the older ventilation systems are installed using steam heat. When a modification to the exhaust train is required (i.e, a new HEPA filter housing is being replaced), problems are encountered when the use of a steam heater is requested. ASME N509 states "Heaters shall be electric and capable of meeting the requirements of paragraph 4.5 of this standard."⁽¹⁾ In some instances, requiring electric heat also requires the addition of electrical power because of the unavailability of power where the heater is located. The addition of the power will also require an electrical upgrade to meet the current electric code requirements.

In addition, within the tank farm complex certain tanks contain hydrogen. For tanks that contain certain levels of hydrogen it is required that ventilation systems and their components must be intrinsically safe.

A conflict arises when applying paragraph 5.5 of ASME N509.⁽¹⁾ Because an electric heater is required, the system cannot be intrinsically safe because of the amount of electric energy required to heat the gas stream. On the other hand, a steam heater will satisfy the requirement.

Where the intent was to use the existing steam heater and keep costs reasonable and within budget, now it becomes more costly and complex because an electric heater must be installed instead of reusing the steam heater.

III. Summary

ASME N509⁽¹⁾ and N510⁽²⁾ are mandatory codes required by DOE Order 6430.1A⁽³⁾. Applying these codes to older ventilation systems that were constructed before their issuance is often frustrating. Often simple modifications can improve system performance, but the design will not progress unless full compliance to all the code requirements are adhered to.

Although it may seem that the application of ASME N509⁽¹⁾ or N510⁽²⁾ may be a hindrance at times, this does not need to occur. Proper preparation at the start of project or design modifications can minimize frustration to the engineer when it is judged that portions of ASME N509⁽¹⁾ and N510⁽²⁾ do not apply in a particular application.

If the engineer can provide a technical justification for deviation from ASME N509⁽¹⁾ or N510⁽²⁾ and the justification will demonstrate that another method would be technically similar or produce the results intended by these ASME codes, then a waiver can be requested from the DOE for deviation.

DOE Order 6430.1A allows for waivers from the *General Design Criteria*, provided the deviation follows specific guidelines.⁽³⁾ The following is quoted in part from Section 0101-2, titled "Criteria Deviations."

For all projects subject to DOE 6430.1 series, these criteria are not intended to impose unnecessary design restrictions or requirements or to discourage design innovation. Professional

architectural and engineering judgment shall be used in the interpretation and application of these criteria to specific projects.

The contractor and/or DOE organizations responsible for facility projects shall review these criteria early in the planning phase and at later phases during the project construction process to determine if any of these criteria are not applicable or are not appropriate.

The contractor shall document the criteria being used for each project in the project's SAR (per Section 0110-5.2, "Safety Analysis") such that compliance with these criteria can be verified during design, construction, and facility operation. Site-specific criteria shall be included in this documentation.

The principal objective at the Hanford Site is to provide safety to personnel and the environment. The ASME N509⁽¹⁾ and N510⁽²⁾ are necessary and aid in preventing unsafe HEPA filtration systems from being designed and installed.

If, in the opinion of the engineer, a particular paragraph does not apply, then the responsibility rests upon the engineer to convince the appropriate personnel that, based upon technical justification, a waiver from ASME N509⁽¹⁾ or N510⁽²⁾ is warranted.

Frequently a simple modification will enhance the system performance and become safer than no modification at all.

IV. References

1. ASME N509, *Nuclear Power Plant Air Cleaning Units and Components*, ASME N509-1989, American Society of Mechanical Engineers, New York, New York.
2. ASME N510, *Testing of Nuclear Air-Cleaning Systems*, ASME N510-1989, American Society of Mechanical Engineers, New York, New York.
3. DOE Order 6430.1A, *General Design Criteria*, U.S. Department of Energy, Washington, D.C.
4. DOE Order 4300.1B, *Real Property Management*, U.S. Department of Energy, Washington, D.C.
5. RLIP 5480.4C, *Environmental Protection, Safety, and Health Protection Standards for RL*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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