

Minnesota Rules, Chapter 4732 X-ray Revision

PROPOSED DRAFT GAUGING X-RAY SYSTEMS, 1.0

4732.##### GAUGING X-RAY SYSTEMS.

Subpart 1. **Applicability.** A registrant's gauging x-ray system must comply with the requirements of this part.

X-RAY SYSTEMS

Subp. 2. **Safety Device.** A registrant is responsible for the requirements of this subpart.

Commented [JC(1)]: OR; 333-115-0010

A safety device for a gauging x-ray system must:

- A. prevent the entry of any portion of an individual's body into the useful beam; or
- B. provide a shut-off feature that prevents any part of an individual's body from being exposed to the useful beam; and
- C. disable the high voltage automatically before loss of any shielding in the event of fire or elevated temperatures.

Commented [JC(2)]: ANSI N43.8 3.1.2(materials?)

Subp. 3. **Warning lights and devices.**

Commented [JC(3)]: Similar to NC, TX, ANSI, OH OR has "Beam-on"

- A. A discernible and visible warning light labeled with the words "X-RAY ON, or other visible warning indicator, must:
 - (1) be located on or near a switch that energizes an x-ray tube; and
 - (2) illuminate only when the tube is energized.

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B. Warning devices must be labeled so that the purpose is easily identified. For gauging x-ray systems installed after the effective date of this part, a warning device must have a fail-safe design.

C. An x-ray tube "on-off" status indicator must be located near the radiation source housing. This requirement may be met if the warning indicators are visible and discernible by anyone near the useful beam.

D. The shutter "open-closed" status indicator must be located near each beam port on the radiation source housing if the useful beam is controlled with a shutter. This requirement may be met if the status light at the control panel is visible and discernible by anyone near the useful beam.

Commented [BB(4)]: Focus Group: Do shutters apply?

Subp. 4. Beam ports. Unused ports on radiation source housings must be secured in the closed position that prevents opening.

Commented [JC(5)]: •TX: "ports": 289.228, (e, 2, c, 3) Similar: TN, OR

Subp. 5. Shutters. For a gauging x-ray system designed with shutters:

Commented [JC(6)]: Ohio; SSRRCR

A. each beam port on the radiation source housing must be equipped with shutters that cannot be opened unless either a collimator or a coupling has been connected to the beam port; and

B. unused collimators on radiation source housing must be secured in the closed position, or mechanically blocked.

Subp. 6. Labeling. A registrant is responsible for labeling gauging x-ray systems according to this subpart.

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A. A gauging x-ray system must be labeled near any switch that energizes an x-ray tube with a visible and discernible sign bearing the radiation symbol and the words "CAUTION RADIATION - THIS EQUIPMENT PRODUCES IONIZING RADIATION WHEN ENERGIZED", or other words having similar meaning.

Commented [BB(7)]: •ANSI N43.8-2008 (3.8.2),
•Similar: PA, OR
•Few states have, "Warning-X-rays do not place hands in jaws of gauge." TN, TX, OR
•Few states have, "Caution- High Intensity X-ray Beam" OR, NC

B. A gauging x-ray system must be labeled at or near any switch that energizes an x-ray tube with a visible and discernible sign bearing the radiation symbol and the words "Warning-X-rays do not place hands in jaws of gauge", or other words having similar meaning.

Commented [BB(8)]: •ANSI N43.8-2008 (3.8.2),
•Similar: PA, OR
•Few states have, "Warning-X-rays do not place hands in jaws of gauge." TN, TX, OR
•Few states have, "Caution- High Intensity X-ray Beam" OR, NC

Subp. 7. Safety device evaluation. A registrant is responsible for the safety device evaluation of a gauging x-ray system safety device:

Commented [JC(9)]: Focus Group: Thoughts? Some states have "jaws of gauge" language.
Also consider:
A gauging x-ray system must be labeled at or near the x-ray beam port to identify the location of the beam with the words "CAUTION - HIGH INTENSITY X-RAY BEAM", or other words having similar meaning.

A. upon installation and

Commented [JC(10)]: TX has 12 month testing for interlocks
TN, OR: test quarterly

B. at intervals not to exceed 180 days.

Commented [JC(11)]: NC: 3 months

C. For purposes of this subpart, a safety device evaluation includes:

(1) safety device under subpart 2;

(2) shutters;

(3) warning lights;

(4) warning devices; and

(5) required emergency shut-off switches.

Commented [JC(12)]: Focus Group: We were not able to find "emergency shut-off switches" in other states' regulations. Is it needed here?

D. A safety device evaluation must verify that:

(1) all gauging x-ray system safety devices are functioning as designed; and

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(2) all labels are legible and visible.

E. If a gauging x-ray system safety device is not functioning as designed, then it must be:

(1) labeled immediately as defective; and

(2) removed from service until the safety device is repaired.

F. A registrant must maintain a record of safety device evaluations for a gauging x-ray system. The record must include:

(1) the dates of evaluations;

(2) a list of the safety devices evaluated;

(3) the results of the evaluation;

(4) the name of the individual performing the evaluation; and

(5) corrective actions recommended and performed for any safety device that fails the required evaluation.

G. When a gauging x-ray system is returned to service after being locked-out and tagged, it must be evaluated before use if the date of the last safety device evaluation exceeds the six-month interval.

H. A gauging x-ray system that is locked out and tagged "DO NOT USE" by the radiation safety officer is exempt from this subpart.

Subp. 8. Radiation emission limit. A gauging x-ray system must be located and arranged to include sufficient shielding or access controls to prevent radiation emission in any area

Commented [JC(13)]: SSRRCR; page H9, Section H.6 (j)

surrounding the local component group which may result in a dose to an individual in excess of the dose limits under part 4732.####. The dose limits must be met at the maximum operating parameters.

Subp. 9. **Useful beam attenuation.** A registrant must provide protective measures when the useful beam is not intercepted by the detector device under all conditions of operation to avoid exposure to any individual from the useful beam. Protective measures include auxiliary shielding or administrative procedures.

AREA SURVEY REQUIREMENTS

Subp. 10. **Area survey.** A registrant is responsible for an area survey of gauging x-ray system that complies with the radiation emission requirements under subpart 8. Qualified personnel must perform an area survey:

- A. upon installation or relocation of the gauging x-ray system;
- B. after any maintenance that requires the disassembly or repair of components that affects the output of a gauging x-ray system; and
- C. with radiation survey instruments calibrated according to part 4732.####.

Commented [JC(14): Focus Group: Do we include shielding and beam attenuation here?

CONDITIONS OF OPERATION

Subp. 11. **Safety procedures.** A registrant must develop and comply with operating and emergency procedures for a gauging x-ray system.

Commented [JC(15): SSRRC: page H4, in definitions

- A. Operating and emergency procedures may be maintained in electronic or written form;

- B. Operating and emergency procedures must include:
- (1) storage and security of a gauging x-ray system to prevent unauthorized use, removal, or accidental production of ionizing radiation when the gauging x-ray system is not under the control and constant surveillance of an operator or the registrant;
 - (2) Verification of the operability and safety of the gauging x-ray system before each use and any corrective measures performed;
 - (3) equipment malfunctions;
 - (4) minimizing exposure of individuals in the event of an accident;
 - (5) notifying proper personnel in the event of an accident; and
 - (6) locked out and tagged.
- C. No individual may operate a gauging x-ray system in any manner other than that specified in the operating procedures unless the individual has obtained written approval from the radiation safety officer (RSO).
- D. Operating and emergency procedures must be available to an operator of a gauging x-ray system.

Commented [BB(16)]: SSRCR; page H8, section H.6. (h)

Commented [BB(17)]: SSRCR, Sec. I.10 (f).

Subp. 12. **Repair and modification.** Only qualified personnel may repair or make modifications to a registrant's gauging x-ray system.

- A. The x-ray power source must be locked out and tagged for routine shutdown before repairing or modifying a gauging x-ray system.
- B. Qualified personnel must verify that the x-ray source is off, and remains off, before an operation that involves removing the covers, shielding materials,

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radiation source housing, modifications to shutters, collimators, or useful
beam attenuators.

Subp. 13. Records.