

## Minnesota Rules, Chapter 4732 X-ray Revision

DRAFT GAUGING X-RAY SYSTEMS, 2.0

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

#### Summary of Changes

MDH made a number of changes to the Non-Medical Hand-Held X-ray Systems v1.0 rule draft based on the industrial focus group's review and feedback at the February 9, 2018 meeting. The changes are described below.

##### Subp. 4. Beam ports.

- Deleted this subpart.

##### Subp. 4. Shutters. [Renumbered]

- Deleted **item B**.

##### Subp. 5. Labeling. [Renumbered]

- **Item B**. Deleted "Warning – X-rays do not place hands in jaws of gauge" and replaced with "CAUTION – HIGH INTENSITY X-RAY BEAM"

##### Subp. 6. Safety device evaluation. [Renumbered]

- Deleted "safety device" at the end of first sentence.
- **Item C**. Deleted sub-item (5).

##### Subp. 7. Radiation emission limit. [Renumbered]

- No change.

##### Subp. 8. Useful beam attenuation. [Renumbered]

- Deleted "auxiliary" and replaced with "additional"

##### Subp. 9. Area survey. [Renumbered]

- **Item B**. Revisions in **bold**: "after any maintenance that requires the disassembly or repair of local components that affects the output and shielding of a gauging x-ray system."

**Subp. 10. Safety procedures. [Renumbered]**

- **Item B.** Deleted subitems (1) and (2) and replaced with “(1) daily visual and operability checks of the gauging x-ray system before use on each day;”
- **Item B.** Revisions to subitem (3) in bold: “**responding to equipment malfunctions**”

**Subp. 11. Repair and modifications. [Renumbered]**

- Item A. Deleted “routine”

**Subp. 12. Records. [Renumbered]**

## 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 visible and discernible 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 x-ray tube is energized.
- B. 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.

C. 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.

D. The shutter "open-closed" status indicator must be located near the x-ray exit 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.

Subp. 4. **Shutters.** A gauging x-ray system designed with shutters must be equipped with shutters that cannot be opened unless a collimator or a coupling has been connected to the beam port.

**Commented [JC(4):** SSRCR H.8 (p. 13

Subp. 5. **Labeling.** A registrant is responsible for labeling gauging x-ray systems according to this subpart.

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(5):** •ANSI N43.8-2008 (3.8.2),  
•Similar: PA, OR

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 "CAUTION- HIGH INTENSITY X-RAY BEAM", or other words having similar meaning.

**Commented [BB(6):** •ANSI N43.8-2008 (3.8.2),  
•Similar: PA, OR

Subp. 6. Safety device evaluation. A registrant is responsible for the safety device

evaluation of a gauging x-ray system:

- A. upon installation and
- B. at intervals not to exceed 180 days.
- C. For purposes of this subpart, a safety device evaluation includes:
  - (1) safety device under subpart 2;
  - (2) shutters;
  - (3) warning lights; and
  - (4) warning devices.
- D. A safety device evaluation must verify that:
  - (1) all gauging x-ray system safety devices are functioning as designed; and
  - (2) all labels are visible and discernible.
- 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;

**Commented [JC(7)]:** TX has 12 month testing for interlocks  
TN, OR: test quarterly

**Commented [JC(8)]:** NC: 3 months

**Commented [JC(9)]:** SSRCC; page H9, Section H.6 (j)

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

H. 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 180 days.

Subp. 7. **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 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. 8. **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 additional shielding or administrative procedures.

## AREA SURVEY REQUIREMENTS

Subp. 9. **Area survey.** A registrant is responsible for an area survey of gauging x-ray system that complies with the radiation emission requirements under subpart 6. 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 local components that affects the output and shielding of a gauging x-ray system; and
- C. with radiation survey instruments calibrated according to part 4732.####.

## CONDITIONS OF OPERATION

Subp. 10. **Safety procedures.** A registrant must develop and comply with operating and emergency procedures for a gauging x-ray system.

Commented [JC(10)]: SSR CR; 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) daily visual and operability checks of the gauging x-ray system before use on each day to verify that:
    - (a) the equipment is in good working condition; and
    - (b) required labeling under subpart 6 is present.
    - (c) If equipment problems are found during a daily check, then the equipment must be removed from service until it is repaired.
  - (2) responding to equipment malfunctions;

DRAFT GAUGING X-RAY SYSTEMS, 2.0

- (3) minimizing exposure of individuals in the event of an accident;
- (4) notifying proper personnel in the event of an accident; and
- (5) 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).

Commented [BB(11)]: SSRRC; page H8, section H.6. (h)

D. Operating and emergency procedures must be available to an operator of a gauging x-ray system.

Commented [BB(12)]: SSRRC, Sec. I.10 (f),

**Subp. 11. 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 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, radiation source housing, modifications to shutters, collimators, or useful beam attenuators.

**Subp. 12. Records.**

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