

The type, size, and thickness of a lead apron used in occupational radiation environments will often depend on the following:

- a. The Regulatory Requirements of the facility as provided by any number of regulatory and/or governing bodies.
- b. The proximity of the individual to the source of radiation.
- c. The radiation workload (proportional to level of radiation and time in radiation field).
- d. The motions and activities of the individual within the radiation room.
- e. The physical characteristics and health of the individual.

When majority of a worker's time faces the radiation source, the protection provided by the front of the apron is most important. If, however, a worker moves about the room often turning the body so that their back faces the radiation source, a full wrap (wrap-around; front & back) apron is more important for them. When considering aprons for multiple personnel who work within a room where a fluoroscope or other source of radiation is used, then enough aprons and protective equipment should be made available for each individual task and duty performed within this room.

To qualify for Techno-Aide's limited manufacturer warranty, products that contain lead or lead equivalent materials must be inspected upon receipt to make certain that there are no flaws and loss of integrity in the shielding provided by the apron. Documentation of this inspection must be maintained throughout the warranty period.

Leaded or lead equivalent products should be checked, at minimum, on an annual basis by radiographic means (such as standard film or digital x-ray) to validate their shielding integrity. The decision to reject an apron from flaws that are identified during testing depends on the location, areal size, and the number of validated flaws present. It is best to keep the number of flaws to a minimum, however minimum levels of acceptable variations and flaws (i.e., micro pinholes, discolorations, etc.) in protective media can vary based on regions, local regulations, and/or other standards. There are no official regulatory or scientific standards establishing a universal rejection criterion for lead or lead equivalent aprons. If a worker finds that they have been working with an apron that has unacceptable critical flaws as determined by their governing standards, then it is recommended an investigative evaluation of the possible exposure be performed.

There are many recommended best practices when determining the acceptable level of core material variances and/or imperfections (i.e., pinholes, discolorations, dark spots, etc.). A 2001 operational topic and study titled, "Inspection of Lead Aprons: Criteria for Rejection," published by the [Health Physics Society](#) provides a commonly applied methodology.

Upon inspection of the core media contained in a Techno-Aide garment, you may observe small or large discolorations that appear as lighter spots (during plain film radiographic inspection) or darker spots (during fluoroscopic inspection) than the surrounding media. This type of variance is an indication of localized grouping of attenuating content particles, causing a thickness variation. This type of variance is acceptable as it increases the attenuation percentage due to the increased number of attenuating particles.

Additional discolored patches or spots (the inverse of the above-mentioned discolorations based on the type of imaging being used) can also show during imaging. These types of distortions typically indicate micro-thickness variations in the core media. Defined edges (such as straight lines or Sharp angles)

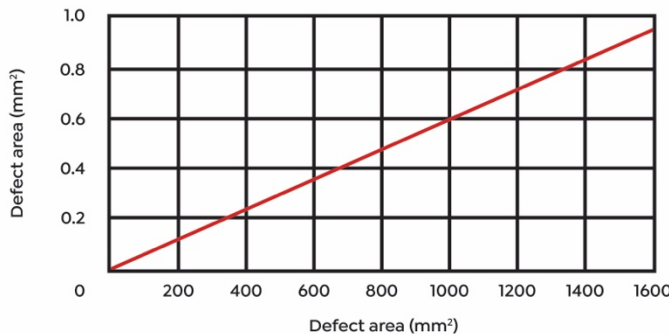
however can be an indication of damage to the core material. These are often a result of misuse, improper handling, and/or incorrect storage of the product. Leaded (and lead equivalent) products should never be folded or creased or stored draped over sharp edges.

Important considerations when inspecting garments:

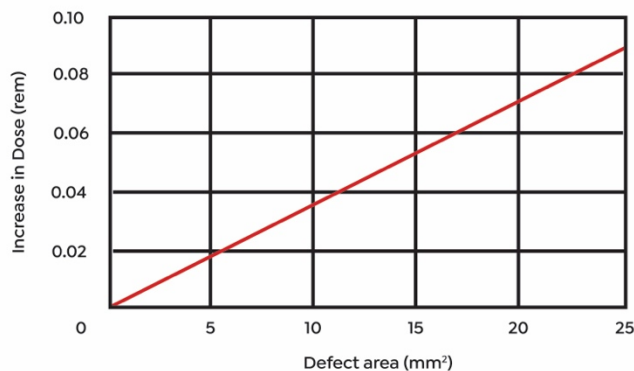
- a) Discolorations or variations can show differently based on the calibration of the imaging machine and/or the kV used during testing.
- b) The life expectancy for leaded aprons is assumed to be 2-5 years. However, frequency of use, cleaning and care routines, storage processes, and environments can drastically reduce or increase the life expectancy of any lead or lead equivalent product.
- c) Defects are assumed to appear the longer products are in service, with chances increasing substantially past the first year of use.
- d) Techno-Aide recommends considering replacements of protective garments every 18-24 months based on historical industry use and the average levels of wear and tear. Determination of this frequency can be supported by routine inspections.
- e) Sewing holes and marks in either the core media or fabrics used in production are excluded from considerations for replacement.

Techno-Aide recommends the following rejection criteria for leaded or lead equivalent products based on dose gauges of 0.4 mSv as noted in the above-mentioned study:

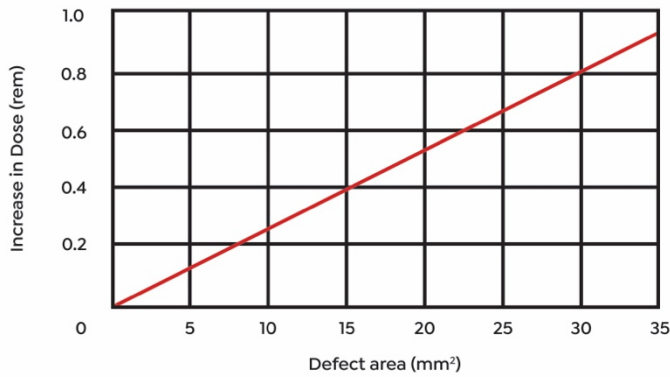
- a) Techno-Aide recommends Aprons [front, full wrap, two-piece vests and/or skirts] be rejected and replaced if the sum of the areas of defects exceeds 122.72 mm² (equivalent to a 12.5mm diameter circular hole). *Industry accepted standards recommends rejection and replacement if the sum of the areas of defects exceeds 670 mm² (equivalent to a 29 mm diameter circular hole).*



- b) Techno-Aide recommends Thyroid shields (guards) should be rejected and replaced if the sum of the areas of defects exceeds 11 mm² (equivalent to a 3.8 mm diameter circular hole).



- c) Techno-Aide recommends Gonadal shields (guards) should be rejected and replaced if the sum of the areas of defects exceeds 15 mm² (equivalent to a 4.3 mm diameter circular hole).



For more information please visit <https://techno-aide.com/Warranty-Terms>, or contact us toll free during normal business hours (Monday through Friday, 8am to 4:40pm CST) at 800-251-2629 or email CustomerService@Techno-Aide.com with any questions.

Source

Lambert, K., & McKeon, T. (2001). Inspection of lead aprons: Criteria for rejection. Medical Physics Consultants, Inc. Retrieved 2019, from https://www.mpcphysics.com/documents/ApronInspectionCriteria_for_Rejection.8.pdf

**Data and policies as of 08/01/2022. Subject to change without prior notice.*