

滤线栅产品说明书

Product description of X ray grid

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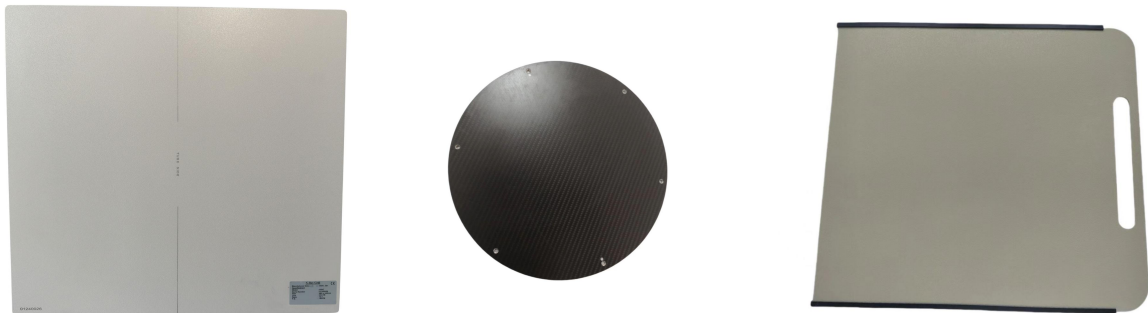
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1. 滤线栅构造

1. X ray grid structure

滤线栅从外观上看是一厚度大约为 3-5mm 的薄板。一般是用厚度为 0.05-0.1mm 的薄铅条, 夹持在厚度为 0.15-0.35mm 的铝或纸等易透过 X 线的填充物中, 使其固定在相互平行或形成一定斜率的状态, 两面再附加铝板或合成树脂板起支撑和保护作用, 成为有一定厚度的能吸收散射线的铅栅板。

The X ray grid appears to be a thin plate with a thickness of approximately 3-5mm. Generally, a thin lead strip with a thickness of 0.05-0.1mm is clamped in a filling material such as aluminum or paper with a thickness of 0.15-0.35mm that is easily transparent to X-rays, and fixed in a parallel or inclined state. Aluminum plates or synthetic resin plates are attached on both sides for support and protection, forming a lead grid plate with a certain thickness that can absorb scattered rays.



2. 滤线栅功能

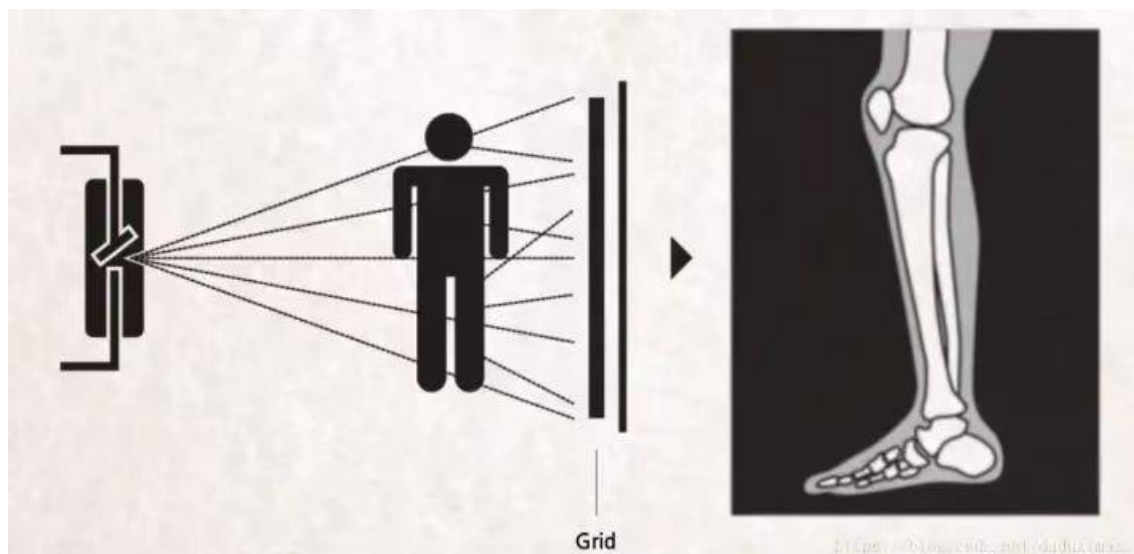
2. X ray grid function

置于人体和胶片之间, 用于滤除散乱射线对胶片的影响。

Placed between the human body and film, used to filter out the impact of scattered radiation on the film.

滤线栅能有效的吸收散射线, 减少胶片灰雾, 提高影像的对比度, 但对原发射线也有吸收, 使用时, 需适当的增加曝光条件。

X ray grid can effectively absorb scattered light, reduce film fog, and improve image contrast, but it also absorbs primary radiation. When using it, it is necessary to increase exposure conditions appropriately.



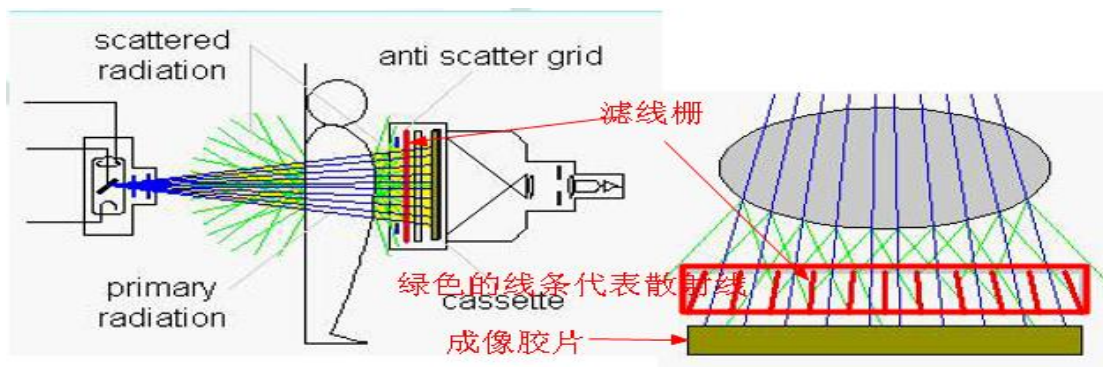
3. 滤线栅的工作原理

3. Operating principle of X ray grid

在摄影时, 将滤线栅放于肢体与胶片之间, 焦点与滤线栅的距离应在滤线栅焦距允许的范围内, 并使 X 射线中心线对准滤线板中心。这样从 X 射线管发出的原发射线与滤线栅的铅条平行, 大部分穿过铅条间隙到达胶片, 小部分照射到铅条上被吸收, 散射线因与铅条成角, 不能通过铅条间隙, 大部分被吸收, 减少胶片上的散射线量, 进而增加成像图片的清晰度。

When taking photos, place the filter grid between the limbs and the film. The distance between the focal point and the filter grid should be within

the allowable range of the filter grid focal length, and align the X-ray centerline with the center of the filter plate. In this way, the primary radiation emitted from the X-ray tube is parallel to the lead bars of the filter grid. Most of it passes through the gaps between the lead bars and reaches the film, while a small portion is absorbed by the lead bars. Scattered radiation cannot pass through the gaps between the lead bars due to its angle with them, and most of it is absorbed, reducing the amount of scattered radiation on the film and increasing the clarity of the imaging image.



4. 滤线栅的分类

4. Classification of x ray grid

1. 按运动功能:

1. According to the motion function:

(1) 静止式滤线栅

(1) Static X ray grid

(2) 运动式滤线栅

(2) Dynamic X ray grid

2. 按照材质:

2. According to the material:

(1) 常用滤线栅:内部间隔物为非金属材料,如木片,纸片,塑料等非金属低密度材料

(1) Common X ray grid: The internal spacer is made of non-metallic materials such as wood chips, paper sheets, plastics, and other non-metallic low-density materials.

3. 按照结构:

3. According to the structure

(1) 会聚栅: 每根铅条向焦点倾斜, 即铅条延长线集中于焦点.

(1) convergence grid: each lead is inclined to the focus, that is, the extension line of the lead is concentrated in the focus.

(2) 平行栅: 每根铅条在垂直平面内相互平行

(2) parallel grid: each lead bar is parallel to each other in the vertical plane.

(3) 交叉栅: 由两层平行栅组合而成, 铅条方向互称 90°

(3) Cross grid: it is composed of two parallel grids, and the direction of lead bars is 90 degrees.

(4) 圆弧栅: 由中心向外扩展等半径叠合而成, 瓦片状.

(4) Arc grating: it is formed by overlapping the center outwards with equal radius and is tile-shaped.

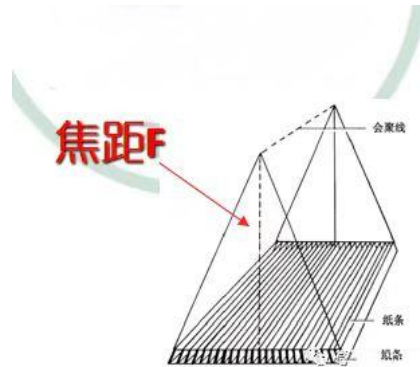
5. 滤线栅的主要参数

5. Main parameters of X ray grid

(1) 焦距(f): 从断面看, 每条铅条的延长线都会会聚到一点。该点到栅板的垂直

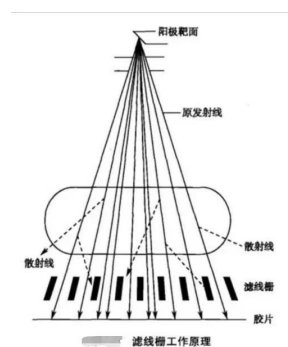
距离即栅板的焦距（半径）。

(1) Focal length (f): From the cross section, the extension line of each lead will converge to one point. The vertical distance from this point to the grating is the focal length (radius) of the grating.



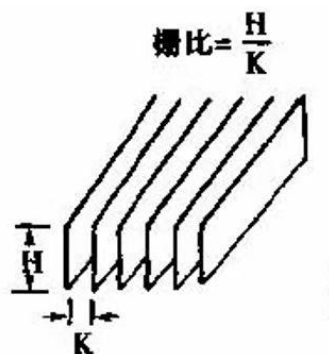
(2) 栅密度 (N): 栅板在每厘米范围内含有的铅条数定义其栅密度。一般使用的栅板栅密度在 40~65 线 / cm。

(2) Grid density (N): The grid density is defined by the number of lead bars contained in the grid plate per centimeter. The grid density of commonly used grids is 40~65 lines/cm.



(3) 栅格比 (R): 指栅板铅条的高度与栅条之间的间隙之比。比值越高，其滤除散射射线的能力越强。一般使用的滤线栅其栅格比在 8: 1~14: 1 之间。

(3) Grid ratio (R): refers to the ratio of the height of the lead bars of the grid plate to the gap between the grid bars. The higher the ratio, the stronger its ability to filter out scattered rays. The grid ratio of commonly used grid is between 8: 1 and 14: 1.



6. 滤线栅的安装

6. Installation of X ray grid

1. 自备开箱工具，开箱后查看产品参数及标签。

1. Self-provided unpacking tools, check product parameters and labels after unpacking.

2. 拿取滤线栅时双手抓牢，防止掉落损坏。

2. Hold the X ray grid firmly with both hands to prevent it from falling and being damaged.

3. 安装时，带标签一面朝向球管，中心线与 X 线中线对齐，不可反置，不可用力按压。

3. During installation, the labeled side should face the tube, and the center line should be aligned with the X-ray center line. It should not be reversed or pressed hard.

4. 进行曝光，确认图像质量。

4. Make exposure to confirm the image quality.

7. 滤线栅使用注意事项

7. Matters needing attention in the use of X ray grid

1. 运输过程中禁止直接堆叠

- 1.1. Direct stacking is prohibited during transportation.
2. 轻拿轻放，禁止弯折。
2. Handle with care, and do not bend.
3. 禁止倒置安装
3. Inverted installation is prohibited
4. 中心线对准滤线栅中心，左右偏移不超过 3cm.
4. Align the center line with the center of the X ray grid, with a left-right deviation of no more than 3cm.
5. 倾斜 X 线管, 与铅条排列方向平行.
5. Tilt the X-ray tube parallel to the direction of the lead bar arrangement.
6. 在允许的范围内使用。
6. Use within the allowed range

8. 滤线栅的使用范围

8. Application scope of X ray grid

1. 滤线栅使用原则中，被照体厚度应超过 15cm，千伏大于 60KV。
1. In the principle of using X ray grid, the thickness of the illuminated object should exceed 15cm and the kilovolt should be greater than 60KV.
2. 滤线栅应置于人体与片盒之间, 聚焦面朝向 X 线入射方向。X 线焦点应置于滤线栅铅条的会聚线
2. The X ray grid should be placed between the human body and the film box, with the focusing surface facing the direction of X-ray incidence. The X-ray focus should be placed at the convergence line of the lead strip

of the X ray grid.

3. 摄影时滤线栅的焦距 f 的改变不应大于或小于焦距的 25%。

3. The change in focal length f of the X ray grid during photography should not exceed or be less than 25% of the focal length.

4. 对于活动式滤线器, 其滤线栅的运动时间应至少长于曝光时间的 $1/5$ 。

For mobile filters, the movement time of the X ray grid should be at least $1/5$ longer than the exposure time.

5. 由于滤线栅会吸收部分原发射线, 故滤线栅摄影时要适当增加曝光条件。

5. Due to the absorption of some primary radiation by the X ray grid, exposure conditions should be appropriately increased during X ray grid photography.

6. 一般四肢拍摄, 不需要使用滤线栅。

6. Generally, limb photography does not require the use of a X ray grid.

7. 摄影条件 40~60KV, 使用栅比 4:1~6:1 (不常用); 摄影条件 80KV, 使用栅比 8:1; 摄影条件 100KV, 使用栅比 10:1; 摄影条件 120KV, 使用栅比 12:1; 摄影条件 140KV, 使用栅比 14:1 (记住千伏就记住了栅比, 基本上算对应关系)

7. Photography conditions: 40~60KV, using a grid ratio of 4:1~6:1 (not commonly used); Photography conditions: 80KV, using a grid ratio of 8:1; Photography conditions: 100KV, using a grid ratio of 10:1; Photography conditions: 120KV, using a grid ratio of 12:1; Photography conditions: 140KV, using a grid ratio of 14:1 (remember the grid ratio for dry voltage, basically calculate the corresponding relationship)

8. 立位摄影架要求滤线栅焦距 180cm, 摄影平床要求滤线栅焦距 100cm。

8. The bucky stand requires a X ray grid focal length of 180cm, and the

photography table requires a X ray grid focal length of 100cm.

9. 乳腺摄影滤线栅常用 80LP/cm 超密纹栅或高通多孔型滤线栅（蜂窝）。

9. The commonly used mammography X ray grid is an 80L/cm ultra dense grid or a high pass porous grid (honeycomb).

10. 高千伏摄影产生较多的散射线, 因而, 选用高栅比滤线栅, 以提高 X 线照片度。

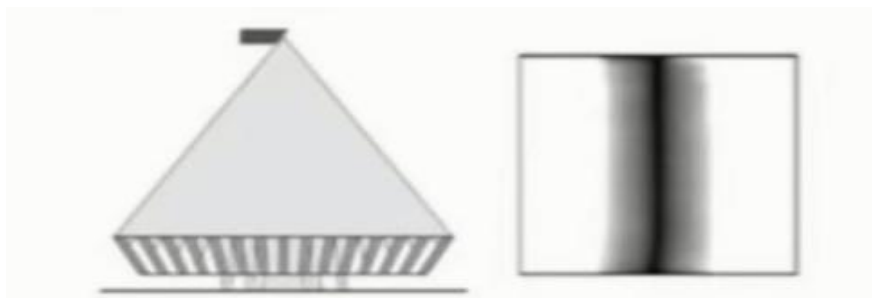
10. High kV photography generates more scattered lines, therefore, a high grid ratio filter grid is selected to improve the X-ray image quality

9. 常见故障处理

9. Common fault handling

1. 故障一: 成像图片呈现对应于栅板中线部分影像密度较高, 两侧密度逐渐减低的效果

Fault 1: The imaging image shows a higher image density corresponding to the centerline of the grid plate, with gradually decreasing density on both sides.



故障分析: 滤线栅反向安装使用

Fault analysis: Reverse installation and use of X ray grid.

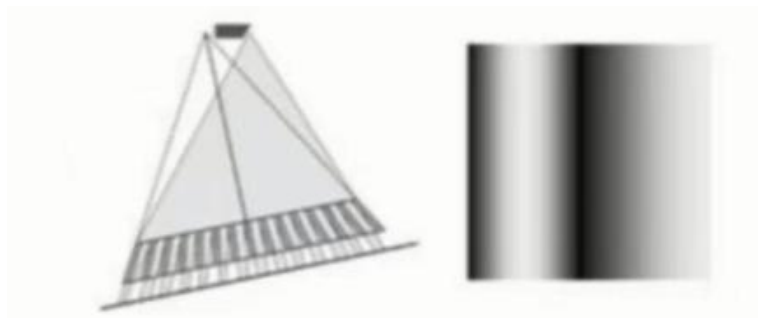
故障处理: 将滤线栅 X 线中线一面朝向球管安装, X 线中心与滤线栅中心对齐

Fault handling: Install the X-ray centerline of the X ray grid facing the

ball tube, aligning the center of the X-ray with the center of the X ray grid.

故障二:成像图片呈现对应于栅板中线部分和一侧影像密度较高,其余密度较低效果

Fault 2: The imaging image shows a higher image density corresponding to the centerline and one side of the grid plate, while the other areas have lower density.



故障分析:侧向倾斜

Fault analysis: Lateral tilt

①摄影距离与栅焦距一致,但x线管焦点向一侧偏离了聚焦线(聚焦点)

① The shooting distance is the same as the grid focal length, but the focus of the X-ray tube deviates from the focal line to one side (focal point)

②摄影距离与栅焦距一致,而栅平面不与X线中心线束垂直,向一侧倾斜了一定角度

② The shooting distance is consistent with the focal length of the grating, but the grating plane is not perpendicular to the X-ray center wire harness and is tilted to one side at a certain angle.

故障处理:①调整X射线管,使其X线中心与滤线栅中心对齐

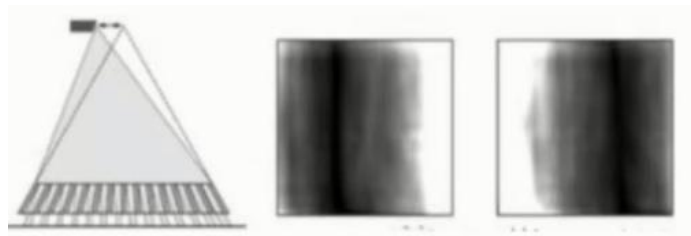
Troubleshooting: ① Adjust the X-ray tube to align its X-ray center with the center of the X ray grid.

②调整栅板, 使其栅板平面与 X 线中心线束垂直

②Adjust the grid plate to make its plane perpendicular to the X-ray center wire harness.

故障三: 成像图片呈现影像密度一边高一边低效果

Fault 3: Imaging image shows high image density on one side and low effect on the other.



故障分析: 双重偏离 (侧向偏离及上下偏离栅焦距同时发生)

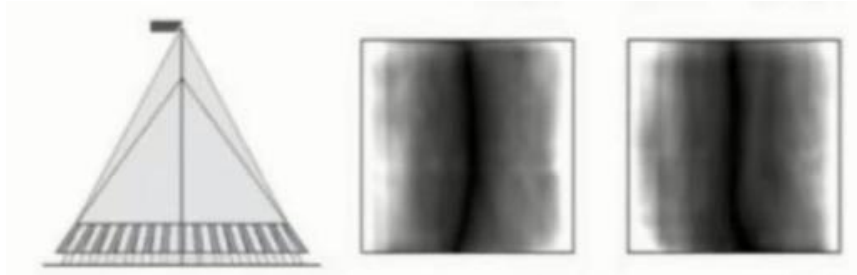
Fault analysis: Double deviation (simultaneous occurrence of lateral deviation and vertical deviation from grid focal length)

故障处理: 调整焦点到滤线栅的距离与栅焦距一致并使 X 线中心对准滤线栅中心

Troubleshooting: Adjust the distance from the focus to the filter grid to match the grid focal length and align the X-ray center with the center of the X ray grid.

故障四: 成像图片呈现中线部分影像密度较高, 两侧密度逐渐减低, 但较为缓和的效果

Fault 4: The imaging image shows a high density in the central line, and the density gradually decreases on both sides, but the effect is relatively gentle



故障分析:上下偏离栅焦距(x 射线管焦点对准栅中心, 其位于栅聚焦线上或下方过大)

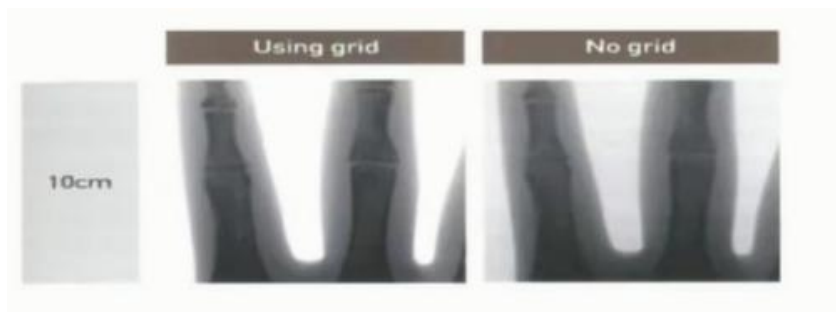
Fault analysis: Up and down deviation from grid focal length (the focus of the X-ray tube is aligned with the center of the grid, and it is located too large on or below the grid focal line)

故障处理:调整焦点到滤线栅的距离与栅焦距一致

Troubleshooting: Adjust the distance from the focus to the X ray grid to match the grid focal length

故障五:成像图片清晰度无明显变化

Fault 5: There is no significant change in the clarity of the imaging image



故障分析:拍摄手或脚等未超过 15cm 厚度体位

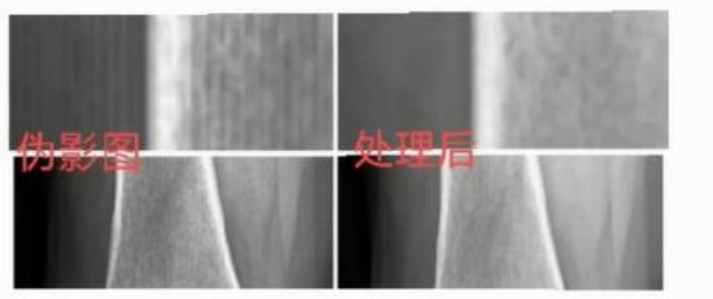
Fault analysis: Shooting positions with hand or foot thickness not exceeding 15cm

故障处理:被照体厚应超过 15cm, 千伏大于 60KV, 更换体位进行测试

Fault handling: The thickness of the illuminated body should exceed 15cm, and the dry voltage should be greater than 60KV. Change the position for testin.

故障六:DR 成像图片出现滤线栅伪影, 清晰度不高

Fault 6: X ray grid artifacts appear in DR imaging images, resulting in low clarity



故障分析: ①使用活动滤线栅, 滤线栅的运动时间未长于曝光时间 ②DR 平板探测器工作站软件的去栅影功能未开启

Fault analysis: ① Using an active X ray grid, the movement time of the filter grid is not longer than the exposure time

②The anti grid shadow function of the DR flat panel detector workstation software is not enabled.

故障处理: ①调整滤线栅运动时间, 使其运动时间至少应长于曝光时间的 1/5
②开启平板探测器工作站软件的去栅影功能

Troubleshooting: ① Adjust the movement time of the X ray grid to be at least 1/5 longer than the exposure time.

②Enable the grid removal function of the flat panel detector workstation software

10. 生产日期: 见标签

10. Date of production: See label

使用期限: 10 年

Service life: 10 years