

**FLUKE®**

**Biomedical**

# **Nuclear Associates 07-591**

## **Focal Spot Test Tool**

**Users Manual**

**Fluke Biomedical  
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## Section 1

# General Information

### 1.1 Introduction

The Focal Spot Test Tool (Model 07-591) provides a simple “pass-fail” test to determine if an x-ray tube focal spot has been damaged. It consists of a 6” high stand with a thirteen-group test pattern. Each group has six bars, three of which are positioned at right angles to the adjacent set. The groups diminish in size from 0.63 line pairs/mm to 2.52 line pairs/mm. By observing the radiograph and using the chart supplied, showing resolution vs. focal spot size, the nominal focal spot dimension (in mm) can be determined.

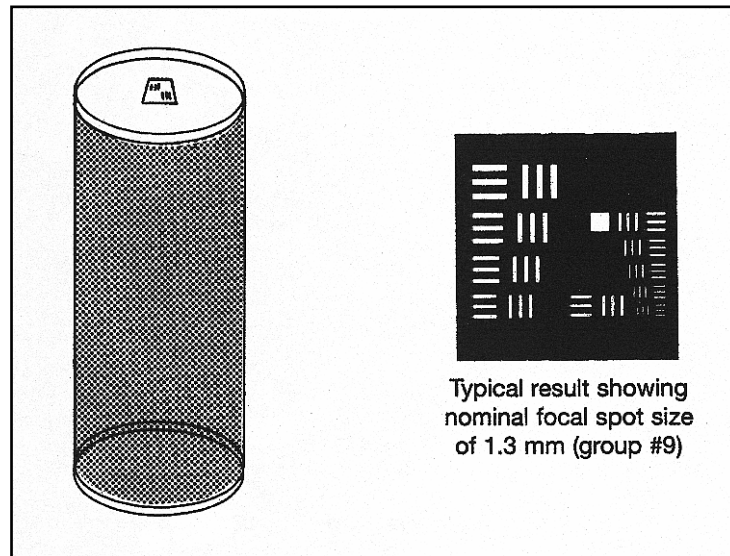


Figure 1-1

### 1.2 Instructions

When checking overhead x-ray systems, position the focal spot of the x-ray tube 18” from the top of the test tool. Adjust the collimator so that the x-ray field is within the dimensions of the base of the test tool. Then set the x-ray generator between 50 and 60 kVp and between 3 and 5 mAs. Place a piece of dental x-ray film (type BF46 or equivalent) or a non-screened film in a cardboard cassette under the cylinder of the test tool, and make the exposure with the small focal spot. Repeat with a second piece of film for the large focal spot.

To check fluoroscopic tubes, place the tool upside-down on the table. Place an absorber such as the Patient Phantom/Penetrator (Model 07-706) or the Copper Test Plate (Model 07-708) on top of the test tool in order to protect the image intensifier. Operate the system in a fluoroscopic mode, and adjust the fluoroscopic shutters so that they limit the beam to the dimensions of the plate. Place the non-screen film between the absorber and the test tool. Using 80 kVp and 1 mA, expose the film for 5 to 10 seconds using the small focal spot.

If desired, a similar test may be used for the large focal spot in many systems, by using an empty cassette in the spot film device and setting the timer for fixed factors of approximately 3 to 5 mAs and making the exposure. In most systems having spot film devices over the table, the focal spot of the x-ray tube is 18" below the surface of the table.

NOTE
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The distance from the pattern to the film is 6". The distance from the source to the pattern must be 18" for the table of results to be valid. As long as the source-to-pattern distance is 3 times the pattern-to-film distance, the table is valid.

If, for example, the source-to-pattern distance is 24", the pattern-to-film distance must be adjusted to 8" by a spacer, perhaps of foam rubber.

### 1.3 Acceptance Criteria

A group of three bars is said to be resolved when exactly three bars may be seen clearly in the x-ray image on the film. If two or four bars are seen, or if the image is just a blur, the image is said to be unresolved. Both groups of bars (at right angles to one another) must be resolved.

Obviously, larger focal spot tubes should resolve only the larger groups. Reference to Table 1-1 indicates what should be expected of focal spots of given sizes. For example, a 2 mm rated focal spot must resolve 5 groups; 1.5 mm must resolve 8 groups; 1.3 mm must resolve 10 groups; 1.0 mm must resolve 11 groups; 0.8 must resolve 13 groups; 0.7 mm and 0.6 mm must resolve 13 groups.

*Table 1-1 Expected Focal Spots of Given Sizes*

Group <sup>2</sup>	lp/mm	Diameter in mm	Focal Spot <sup>1</sup> (Nominal)	Focal Spot (Actual)
1	0.63	6.69	2.0	2.60 x 3.64
2	0.7	5.71	2.0	2.60 x 3.64
3	0.79	4.82	2.0	2.60 x 3.64
4	0.89	4.70	2.0	2.60 x 3.64
5	1.00	4.00	2.0	2.60 x 3.64
6	1.12	3.50	1.8	2.34 x 3.28
7	1.26	3.42	1.8	2.34 x 3.28
8	1.41	2.86	1.5	1.95 x 2.73
9	1.59	2.25	1.3	1.95 x 2.73
10	1.78	2.46	1.3	1.50 x 2.18
11	2.00	2.00	1.0	1.4 x 1.96
12	2.24	1.65	0.8	1.12 x 1.57
13	2.52	1.60	0.8	1.12 x 1.57

<sup>1</sup> In the plane of the focal spot.

<sup>2</sup> Acceptance Level; i.e., 1.8 mm rated focal spot must resolve groups 1, 2, 3, 4, 5, 6, 7.

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