



# JCC-61™/JCC-62™

## Universal Fast Breeder Reactor Subassembly Counters



Modified JCC-62 Universal  
Fast Breeder Reactor  
Subassembly Counter

### KEY FEATURES

- Authorized for routine inspection use by the International Atomic Energy Agency (IAEA) as the Universal Fast Breeder Counter (UFBC)
- Designed for passive neutron measurement of plutonium in fast breeder reactor fuel subassemblies
- Fast Amptek electronics
- Twelve  $^3\text{He}$  detectors
- Transportable

### DESCRIPTION

The JCC-61 and JCC-62 counters are based on a design developed at Los Alamos National Laboratories (LANL) for the United States Department of Energy. They have also been authorized by the International Atomic Energy Agency (IAEA) in Vienna, Austria, for routine inspection use of nuclear material at facilities placed under international safeguards.

The JCC-61 and JCC-62 counters quantitatively measure fast breeder fuel sub-assemblies, individual fuel pins, or a group of fuel pins. They count coincidence neutrons from the spontaneous fission of the even numbered isotopes of plutonium. Subassemblies can be lowered through the top of the counter using a crane. If this is not possible, the door opens to allow side entry. For ease in moving, the door can be removed.

Twelve  $^3\text{He}$  tubes are surrounded by a polyethylene and cadmium sleeve in the central region to flatten the axial response and decrease counter die-away time. The cadmium stops 15 cm (5.9 in.) from the bottom and 17.5 cm (6.9 in.) from the top to compensate for end leakage. The counter is undermoderated to minimize weight and to maximize the amount of plutonium that can be measured. The cadmium liner inside the sample cavity prevents reentry of thermal neutrons which could induce fission in the fuel and adversely affect the measurement.

The JCC-62 counter has an enlarged sample diameter to allow measurement of Super Phenix fuel subassemblies. To compensate for larger end effects, polyethylene collars were added to the ends of the counter.

The  $^3\text{He}$  tubes in the JCC-61 and JCC-62 counters are arranged in a single ring, and are divided into six groups of two. Each group is wired together and connected to one JAB-01 Amplifier/Discriminator circuit board. The six JAB-01s are mounted inside a high voltage junction box. LED indicator lights are placed externally to the junction box to indicate the proper operation of each JAB-01 channel. Electrical connections between the JCC-61 or JCC-62 units and the JSR-12™ analyzer include +5 V and HV. The combination of signals will be combined into a logical OR.

A JSR-12 Neutron Coincidence Analyzer, a computer and analysis software are required for coincidence counting but are not included with the JCC-61 or JCC-62 counters.

## SPECIFICATIONS

### PERFORMANCE

- Die-Away Time – JCC-61: 21.6  $\mu$ s, JCC-62: 28  $\mu$ s.
- Detector Efficiency – JCC-61: 7%, JCC-62: 6%.
- Axial Response<sup>1</sup> – Uniform axial response for 105 cm (41.3 in.) in the center of the counter for both Totals and Reals. For FFTF fuel the active length is 91.4 cm (36 in.).
- Mass Loading – Up to 16 kg (24% <sup>240</sup>Pu).

### PHYSICAL

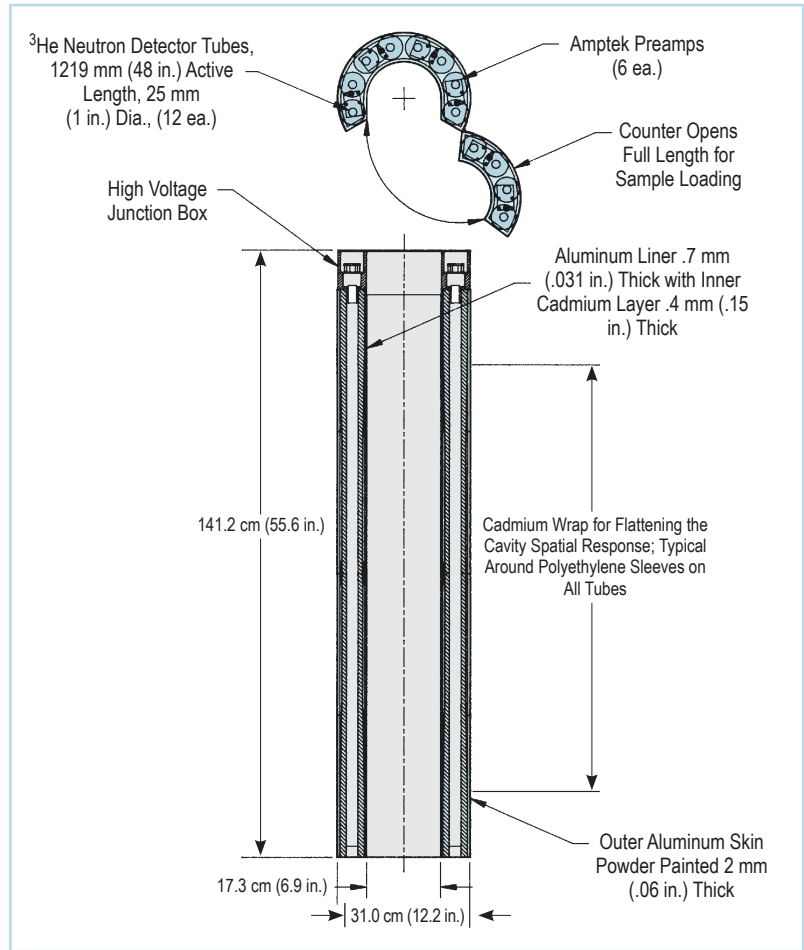
- Size (includes lifting eyes):
  - JCC-61 – 142.5 x 31 cm (56.1 x 12.2 in.) H x Dia.
  - JCC-62 – 149 x 50 cm (58.6 x 19.6 in.) H x Dia.
- Weight – JCC-61: 55 kg (121 lb).
- Sample Cavity Size:
  - JCC-61 – 132 x 16.5 cm (52 x 6.5 in.) H x Dia.
  - JCC-62 – 132 x 23 cm (52 x 9.1 in.) H x Dia.
- <sup>3</sup>He TUBES – 12.
- <sup>3</sup>He Rings – 1.
- <sup>3</sup>He Active Length – 121.9 x 2.54 cm (48 x 1 in.) L x Dia.
- Cladding – Stainless steel.

### OPTIONS

- <sup>252</sup>Cf neutron source (1 each) with source strength of 5x10<sup>4</sup> neutrons/sec for making routine normalization measurements. An aluminum source rod that reproduces the position of the source is included with the counter.
- Transport container.

### REFERENCE

1. Menlove, H.O., et al. (1984). *Universal Fast Breeder Reactor Subassembly Counter Manual*. Report LA-10226-M. Los Alamos, New Mexico: Los Alamos National Laboratory.



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