



Batalum Getters

FOR ELECTRON TUBES

Getters are important in radio tubes, and other electron devices, because they minimize residual gas during useful life. Getters also speed up the final stages of evacuation on the exhaust machine during manufacture.

While there are several materials which act as getters, barium has physical and chemical properties which make it an outstanding getter. A thin barium coating upon the internal surface of a tube envelope presents a chemically active metallic surface to residual gas molecules. Reaction of barium with gases yields non-volatile solids and reduces residual gas to a minimum. Barium is non-volatile at normal temperatures of tube operation and, therefore, does not ordinarily migrate to surfaces where thin metallic films can form electrical leakage paths.

Barium reacts rapidly with atmospheric gases. To produce the pure barium film at the moment it is needed, and to protect it from atmospheric decomposition before use, it is necessary to tie up the barium in some inert alloy or compound. RCA barium getters are of the compound type and utilize barium oxides. When the active metal is needed, the temperature of the getter is raised and a reducing agent within the getter coating reacts with the oxides to produce pure metallic barium.

Since a time-temperature reaction is involved, conditions of "flashing" can be controlled. For example, a full flash can be obtained in less than a second, or, if desired, pure barium can be expelled from the getter over a period of several minutes. Accordingly, a variety of applications is available by control of the getter temperature.

RCA barium getters, broadly identified as Batalum getters, are flashed by passing current through the channel which contains the getter coating. One design provides direct connection of the channel to leads passing through the enclosure which are connected to an external source of power. In another design, the channel is supported on a closed loop which is heated by the field of an external high-frequency coil. A controlled flash is obtained in either method by adjustment of power input to the getter channel. Full flash occurs at 1400°C.

Temperature control is also advantageous in preconditioning the getter on the exhaust machine. Residual gas in the getter coating and support members can be expelled early in the exhaust schedule by applying power controlled to raise the getter temperature to about 900°C. At this temperature, no barium-producing reaction occurs, but the residual gas is expelled and can be pumped out of the tube. The getter is then ready to be flashed without encumbrance by gases which reduce the effectiveness of the vaporized barium.

RCA getters are available in two standard coatings. The "regular"



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getter is used when the relative humidity does not exceed 60% at 80° F, or higher. The "water-resistant" coating is not affected by water or water vapor.

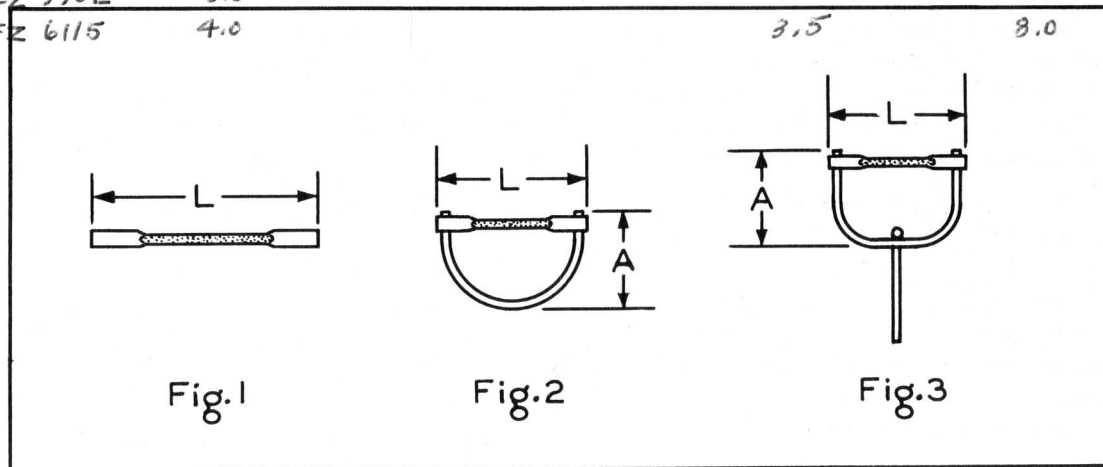
Selection of getter size depends upon tube size. Metal and GT tubes generally use getters which produce about one milligram of barium. Miniature tubes require less getter, while power and cathode-ray tubes may require much more.

The important characteristics of some representative RCA getters are shown in the following list:

Getter RCA Part No.	Approx. Ba Yield, mg.	Approx. Dimensions, mm.			Approximate Degassing Current, amp.	Approximate Flashing Current, amp.
		Fig.	A	L		
(Regular)						
FZ323R	0.5	1	—	12 ± 0.5	2.5	4.0
FZ323H	1.2	1	—	18 ± 0.5	3.0	5.5
FZ323AL	1.4	1	—	16 ± 0.5	3.0	5.5
FZ323Q	1.8	1	—	20 ± 0.5	4.0	6.6
FZ447A	5.2	1	—	20 ± 0.5	11.0	17.0
FZ330J	7.2	1	—	36 ± 1.0	5.0	7.0
FZ6013	14.0	2	23.6 ± 0.25	24.1 ± 0.5	—	—
(Water-resistant)						
FZ323AF	0.5	1	—	12 ± 0.5	2.5	4.0
FZ461A	0.5	2	8 ± 0.5	12 ± 0.5	—	—
FZ473A	1.2	3	6 ± 0.25	15 ± 0.5	—	—
FZ323AC	1.4	1	—	18 ± 0.5	3.0	5.5
FZ323AE	2.2	1	—	20 ± 0.5	4.0	6.5
FZ447B	5.2	1	—	20 ± 0.5	11.0	17.0
FZ330K	7.2	1	—	36 ± 1.0	5.0	7.0

Getters should be stored in stock rooms where the temperature never exceeds 95°F. If the humidity is high, cans containing "regular" getters should be placed in well-attended dessicators.

FZ 6059	6.0	9-10.0	18.0
FZ 330L	3.0	2.0	5.2
FZ 6115	4.0	3.5	8.0



REFERENCES

- E. A. Lederer, "Recent Advances in Barium Getter Technique", RCA Review, Vol. 4, January, 1940.
- E. A. Lederer and D. H. Wamsley, "Batalum, a Barium Getter for Metal Tubes", RCA Review, Vol. 2, July, 1937.

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TUBE DEPARTMENT

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