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RECOMMENDED THERMAL PROCESSING SCHEDULES FOR TV BULBS #9010 GLASS

The following schedules are suggested as proper in attaining reasonable shrinkage rates and avoiding excessive alteration of stress balance in TV bulbs in screenbake and exhaust bake operations.

21" - 23" Bulbs (Except 21"-70° Cyl)

SCREENBAKE

1. Heat at average rate of 15°C/min. from room temperature to peak. Curve should be as smooth as possible.
2. Peak at 420°C - 425°C for not longer than 10 min. Most bakes require 20 to 30 min. above 390° for good tube life.
3. Cool from peak at not less than 2°C/min. (any bulb type) and not more than 5°C/min. to 350°C. Double this rate from 350°C to exit. Exit at not over 120°C.
4. A 100 minute cycle for a belt lehr is normal depending on equipment limitations.

EXHAUST BAKE

1. Pump down as rapidly as possible before heating.
2. Heat at average rate 25° to 30°C/min. avoiding sudden fluctuations in rate (avoid room air drafts) to proper peak (about 405° - 410°C).
3. Cool at average rate from peak to exit at 6-8°/Min.
4. Exit from tunnel at 100°C maximum.
5. A 60 minute cycle is normal, depending on equipment limitations.

GENERAL INFORMATION

All above rates are from temperature measurements at the outside center-face glass surface.

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It is general practice to measure temperature distribution once per day in both operations using a suitable bulb (usually a reject free of checks) with trailing thermocouples placed approximately as follows:

1. Junction (a flattened bead) impressed intimately against the glass surface and held in place by a minimum quantity of quick-drying cement or temperature-durable tape placed back of the junction (on the lead wires).

2. Couples at (1) outside center-face, (2) face panel radius (any axis where glass is thickest), (3) on funnel side of panel-funnel seal (any axis), (4) on funnel at anode elevation plane. In addition, air couples to measure ambient temperature distribution are placed (1) at center-face and, (2) face panel radius.

Placement of couples should be so that temperature gradients from the panel-funnel seal axially across the face panel can be determined at all times. Temperature gradients across the face (radius to radius) exceeding 25°C should be avoided. Temperature gradient across (Perpendicular) to panel seal and centered on same should not exceed 15°C over a 3" span.

A good thumb rule for heating - cooling rates is 5/1 in screenbake and 4/1 in exhaust.

For bulbs larger than 23", where glass thickness gradients are greater, (includes 21"-70° Cyl.) heating rates should be reduced by approximately 20%. Conversely, in 14", 17", and 19" types these rates can be increased by the same margin. The same thumb rule above can apply.

W. O. Smith
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