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TUBE DEPARTMENT

TRIP REPORT

COMPANY VISITED: Corning Glass Company

DATE OF CONTACT: 7/29/52

LOCATION: Corning, New York

DATE OF REPORT: 8/4/52

REPORT BY: J. Berger

(Contact made with G.E. personnel - W.F. Hopkins, A. Letizia, F.G. Ebner)

PERSONS CONTACTED:

Al Dawson	-	Sales
Ray Moore	-	Engineering
Bob Jones	-	Sales

COMMENTS:

Contact was made to obtain answers to several glass problems which originated in the field either as complaints or as requests for information by a number of our picture tube customers.

The following tentative agenda was drawn up prior to the date of contact and was presented to personnel of the Corning Glass Company for their consideration: -

A. 21-inch Picture Tube Envelope

1. Faceplate curvature and tolerances
2. Depressions in the outside surface of the facepanel and visible "dark band" effect around the periphery of the facepanel.
3. Factors determining tolerances on height, width, and diagonal dimensions of facepanel.
4. Screen contour.
5. Problem of spontaneous implosions of picture tubes in the field as reported by several of our customers.

B. 27-inch Spherical Picture Tube Envelope

1. Outline contour of faceplate (projected front view) and tolerances.
2. Screen contour.
3. The faceplate contour (and tolerances) generated by the intersection of the faceplate and planes parallel to the tube axis.
4. Maximum bulb outline contour. (To establish clearances between picture tube and set components.)
5. Effects of mold change on neck contour and yoke fit. In connection with this Corning was requested to furnish several samples of the untrimmed funnels.
6. Polishing of facepanels (relative to a Tube Department development project of applying an anti-reflectance coating to the picture tube facepanel).

Following is a report on the discussions with Corning personnel on each of the above items:

- A. 1. Mr. Moore advised that the radius of curvature of the 21-inch facepanel along lines parallel to the major axis is actually running about  $39\frac{1}{2}$ " , as compared with the 35" radius which appears on the bulb drawing. It was pointed out that the bulb drawing issued by Corning contains design dimensions of the bulb, though not necessarily actual dimensions. The radius of  $39\frac{1}{2}$ " mentioned above was measured at the edges of the quality area, where the picture tube mask makes contact with the long sides of the facepanel. Mr. Moore stated that Corning was in no position to specify tolerances on faceplate curvature for the following reasons: -
- a. The inherent difficulty of measuring radius of curvature quickly and accurately is a deterrent to quality control of that specification.
  - b. Corning's estimate of a realistic tolerance of  $\pm 10$ " on the radius of curvature is much greater than that required by picture tube customers for an improvement in present mask design techniques.

An alternative approach to this problem was suggested to Corning; that the tolerance be expressed as a linear variation from the bogie plane of the facepanel. This approach would also specify a tolerance on the variations mentioned in Item A2 (see page 1). Corning appeared to be somewhat more receptive to this type of tolerance, although they again emphasized their refusal to issue credit at this time on bulbs returned for variations in faceplate curvature. Mr. Moore advised that measurements indicate the present 21-inch bulbs to vary by not more than  $\pm 1/8$ " (measured parallel to the tube axis) from the 35" bogie curve.

- 2. Corning stated that a close inspection of a section of the 21-inch facepanel at the minor axis would show a depression near either edge of the quality area and a slight crest at the center when compared with a straight-edge. Mr. Moore advised that the maximum crest-to-trough dimension measured parallel to the tube axis is .062" and explained that the condition is caused by mold shrinkage, an unpredictable contraction of the glass while cooling. It was also pointed out that the dark band visible around the periphery of the facepanel is caused not by the depressions mentioned above, but by an added thickness of glass in that area caused by a flow of hot glass on the inside of the panel. Mr. Moore advised that his organization is actively engaged in a project to eliminate both undesirable effects, but that no success has yet been achieved.
- 3. Mr. Moore stated that the tolerances on the width, height, and diagonal dimensions of the facepanel were determined by processes in the manufacture of that part itself, and that the dimensions of the bulb at the facepanel-funnel seal are dependent upon tolerances in the facepanel itself, and not vice-versa. Mr. Moore stated that dimensions of the facepanel have been running on the low side of bogie.
- 4. Corning advised that screen contour is no longer specified on their bulb drawings. This change was made because of differences in screen dimensions adopted by tube manufacturers.
- 5. Corning advised that a 100% inspection is made for any visible defects within the "critical area" of the facepanel, and that all visible defects are re-worked before shipment, or are a cause for rejection. The critical area is defined as the area approximately 6" x 2" at the edges of the minor axes of the panel, the 6" dimension running along the long edge of the



panel and the 2" dimension running around the bend of the panel. When questioned, Corning replied that they did not state specifications defining rejectable bulbs to any of our customers (Westinghouse, Stromberg-Carlson) but had discussed only "generalities" with them.

Mr. Moore stated that Corning is presently pressure testing approximately one abraded bulb per type per shift. The abrasion represents the equivalent of severe mishandling of the bulb, and the test is performed at a three-atmosphere pressure differential between inside and outside surfaces of the bulb.

- B.
1. Mr. Moore advised that his company was in no position to specify tolerances on radii of curvature in the projected front-view drawing of the 27-inch facepanel. These variations, he explained, are caused by mold shrinkage and have not been measured.
  2. Screen contour is not specified on the Corning drawing of the 27-inch bulb for the reason stated in A4 above.
  3. Corning cannot furnish any additional information as to the exact surface of the 27-inch facepanel and will not at this time specify maximum variations from such a bogie surface. As in the case of the 21-inch bulb, Corning's reasons for their stand are the difficulties encountered in measurement and process control.
  4. As an aid in establishing clearances between the picture tube and other set components, Corning advises a minimum allowance of  $\frac{1}{2}$ " clearance above and beyond the dimensions of the bulb outline which appear in Corning's drawing.
  5. At our recommendation, Corning has reworked that portion of the funnel mold which forms the neck contour. The included angle on present production bulbs is  $90^\circ$  as compared with an angle of  $90-3/4^\circ$  on bulbs previously shipped us. Four untrimmed funnels made from the new mold have been sent us for our approval. Measurements of inside plug gauge penetration are being made on these funnels.
  6. Mr. Moore explained that the tiny pits which appear on the outside surface of the facepanel are caused by dust particles which settle on the chrome-plated mold for that part. It was pointed out that almost all bulbs are polished, at least in localized areas of the panel. A current development project at Corning calls for an automatic polishing machine which will polish the entire facepanel of a 27-inch bulb in two runs. Corning anticipates good results from this project.

JB/V

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