These general notes include definitions and general test procedures. They should be read in conjunction with the data sheets for Special Quality Valves. Where reference should be made to a specific note, this is indicated on the data sheet by an index number, e.g. Group Quality Level.[10]

1. *Heater voltage.* Life and reliability of performance are a function of the value and degree of regulation of the heater voltage. In order to achieve the maximum useful life the heater should be maintained as close as possible to its rated value, and unless specific recommendations are made on individual data sheets, designers should aim to maintain the voltage at the valve pins within $\pm 5\%$ of the published nominal value.

2. *Capacitances.* Unless otherwise stated the capacitances quoted are measured with the valve cold in a fully screened socket. The measurements are made with or without an external shield, as stated on the individual data sheets.

3. *Electrode voltages.* In Special Quality Valve data, the reference point for all electrode voltage measurements except heater to cathode and suppressor grid voltages is the negative end of the cathode resistor, where used. The reference point for heater to cathode and suppressor grid voltages is the positive end of the cathode resistor, unless otherwise stated.

4. *Limiting Values.* The limiting values quoted on the data sheets are absolute ratings and must not be exceeded under any circumstances. Variations such as supply fluctuations, component tolerances and switching surges must be taken into account in deciding the nominal valve operating conditions.

   The life expectancy may be reduced if conditions other than those specified for life test are imposed on the valve and will be reduced appreciably if absolute maximum ratings are exceeded.

   Heater to cathode voltage. In the interests of reliability the heater to cathode voltage should always be kept as low as possible, and it is preferable to have the cathode positive with respect to the heater.

   Bulb temperature. In the interests of reliability the bulb temperature should always be kept as low as possible.

5. *The A.Q.L.* (Acceptable Quality Level) is the limit below which the average percentage of defectives is controlled.

6. *Maximum and minimum values for the individuals* are the limits to which valves are tested.

7. *Maximum and minimum for lot average* are the limits between which the average value of the characteristic of a lot or batch is controlled.

8. *Lot standard deviation* is the standard deviation of a single lot or batch.

9. *Bogey value* is the target value.

10. *Group quality level.* This is the A.Q.L. (Acceptable Quality Level) over a whole group of tests.

    Sub-group quality level. The A.Q.L. over a number of tests, which do not constitute a complete group.

11. *Glass envelope strain test.*

    (A) This test is carried out on a sampling basis and consists of completely submerging the valves in boiling water at a temperature between 97 and 100°C for 15 seconds and then immediately plunging them in ice cold water for 5 seconds. The valves are then examined for glass cracks.

    (B) This test is carried out on a sampling basis and consists of completely submerging the valves in boiling water not less than 85°C for 15 seconds and then immediately plunging them in ice cold water not more than 5°C for 5 seconds. The valves are then examined for glass cracks.

12. *Base strain test.* This test is carried out on a sampling basis and consists of forcing the pins of the valves over specified cones and then completely submerging the valves and cones in boiling water at a temperature between 97 and 100°C for 10 seconds. The valves and cones are allowed to cool to room temperature before examining for glass cracks.

13. *Lead fragility test.*

    (A) This test is carried out on a sampling basis and consists of holding the valves vertically and having a 1-lb weight freely suspended from the lead under test. The valves are inclined slowly so as to bend the weighted lead through 45°, brought to 45° in the other direction, back again to 45° in the first direction and finally returned to the vertical, the entire action taking place in one vertical plane. The valves are examined for cracks and broken leads.

    (B) This test is carried out on a sampling basis and consists of holding the valves vertically and having a 1-lb weight freely suspended from the lead under test. The valves are inclined slowly so as to bend the weighted lead through 90° and then returned to the vertical, the entire action taking place in one vertical plane. This cycle is repeated for the number of times shown on the data sheet. The valves are examined for broken leads.

14. This test is carried out on a sampling basis under the conditions detailed in the data.

15. *Shock test.* This test is carried out on a sampling basis and subjects the valves to 5 blows of the specified acceleration in each of 4 directions.

16. *Inoperatives.* An inoperative is defined as a valve having an open or short circuited electrode, an air leak or a broken pin.