# 22UP22

## Color Picture Tube

**Perma-Chrome** **Banded-Type Implosion Protection**
**90° Rectangular** **HI-LITE Screen**
**New Rare-Earth (Red) Phosphor** **Unity Current Ratios**

### ELECTRICAL

| | | |
|---|---|---|
| Electron Guns, Three with Axes Tilted Toward Tube Axis | Red, Blue, Green | |
| Heater, of Each Gun Series Connected within Tube with Each of the Other Two Heaters: | | |
| Current at 6.3 V[a] | 900 | mA |
| Focusing Method | Electrostatic | |
| Focus Lens | Bipotential | |
| Convergence Method | Magnetic | |
| Deflection Method | Magnetic | |
| Deflection Angles (Approx.): | | |
| Diagonal | 90 | deg. |
| Horizontal | 79 | deg. |
| Vertical | 63 | deg. |
| Direct Interelectrode Capacitances (Approx.): | | |
| Grid No.1 of any gun to all other electrodes | 6 | pF |
| Grid No.3 to all other electrodes | 6.5 | pF |
| All cathodes to all other electrodes | 15 | pF |
| External conductive coating to anode (Approx.) | 2500 max.<br>2000 min. | pF<br>pF |

### OPTICAL

| | |
|---|---|
| Faceplate | Filterglass |
| Light transmission at center (Approx.) | 42% |
| Surface | Polished |
| Screen, on Inner Surface of Faceplate: | |
| Type | Aluminized, Tricolor, Phosphor-Dot |
| Phosphor (three separate phosphors, collectively)[b] | P22—New Rare-Earth (Red), Sulfide (Blue & Green) Type |
| Fluorescence and phosphorescence of separate phosphors, respectively | Red, Blue, Green |
| Persistence of group phosphorescence | Medium Short |
| Dot Arrangement | Triangular group consisting of red dot, blue dot, and green dot |
| Spacing between centers of adjacent dot trios (Approx.) | 0.025 in (0.64 mm) |

# 22UP22

## MECHANICAL

| | |
|---|---|
| Minimum Screen Area (Projected): | 227 sq. in (1465 sq. cm) |
| Bulb Funnel Designation | JEDEC No.J173-1/2 A1A |
| Bulb Panel Designation | JEDEC No.FP173-3/4 |
| Base | Small-Button Diheptar 12-pin |
| Pin Position Alignment | Pin No.12 Aligns Approx. with Anode Bulb Contact |
| Operating Position | Anode Bulb Contact on Top |
| Weight (Approx.) | 29 lb (13.3 kg) |

## MAXIMUM AND MINIMUM RATINGS, Design-Maximum Values

*Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode*

| | | |
|---|---|---|
| Anode Voltage | 27,500 max.<br>20,000 min. | V<br>V |
| Total Anode Current, Long-Term Average | 1000 max. | μA |
| Grid-No.3 (Focusing Electrode) Voltage | 6000 max. | V |
| Peak Grid-No.2 Voltage, Including Video Signal Voltage | 1000 max. | V |
| Grid-No.1 Voltage: | | |
| Negative bias value | 400 max. | V |
| Negative operating cutoff value | 200 max. | V |
| Positive bias value | 0 max. | V |
| Positive peak value | 2 max. | V |
| Heater Voltage (ac or dc): | | |
| Under operating conditions[a] | 6.9 max.<br>5.7 min. | V<br>V |
| Under standby conditions[c] | 5.5 max. | V |
| Peak Heater-Cathode Voltage: | | |
| Heater negative with respect to cathode: | | |
| During equipment warm-up period not exceeding 15 seconds | 450 max. | V |
| After equipment warm-up period: | | |
| Combined AC and DC value | 200 max. | V |
| DC component value | 200 max. | V |
| Heater positive with respect to cathode: | | |
| AC component value | 200 max. | V |
| DC component value | 0 max. | V |

## EQUIPMENT DESIGN RANGES

*Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode*

*For anode voltages between 20,000 and 27,500 V*

Grid-No.3 (Focusing Electrode) Voltage . . . . . 16.8% to 20% of Anode Voltage

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot . . . . . See *CUTOFF DESIGN CHART*

Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of −100 V) . . . . . 1.86

Heater Voltage:

| | | |
|---|---|---|
| Under operating conditions[a] . . . . . | 6.3 | V |
| Under standby conditions[c] . . . . . | 5.0 | V |
| Grid-No.3 Current (Total) . . . . . | −45 to +15 | μA |
| Grid-No.2 Current . . . . . | −5 to +5 | μA |

To Produce White 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):

| | *Red* | *Blue* | *Green* | |
|---|---|---|---|---|
| Percentage of total anode current supplied by each gun (average) . . . . . | 34 | 32 | 34 | % |

| Ratio of cathode currents: | *Min.* | *Typ.* | *Max.* |
|---|---|---|---|
| Red/blue . . . . . | 0.75 | 1.10 | 1.50 |
| Red/green . . . . . | 0.65 | 1.00 | 1.50 |
| Blue/green . . . . . | 0.60 | 0.91 | 1.30 |

Displacements, Measured at Center of Screen:

Raster centering displacement:

Horizontal . . . . . ± 0.47 in (± 11.9 mm)

Vertical . . . . . ± 0.45 in (± 11.4 mm)

Lateral distance between the blue beam and the converged red and green beams . . . . . ± 0.25 in (± 6.4 mm)

Radial convergence displacement excluding effects of dynamic convergence (each beam) . . . . . ± 0.37 in (± 9.4 mm)

Maximum Required Correction for Register[d] (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the center of the Screen in any Direction . . . . . 0.005 in (0.13 mm) max.

## LIMITING CIRCUIT VALUES:

*High-Voltage Circuits:*

Grid-No.3 circuit resistance . . . . . 7.5 max. MΩ

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *high-voltage power supply* and the *grid-No.3 power supply* be of the limited-energy type, in which the short-circuit current does not exceed 20 mA.

*Low-Voltage Circuits:*

Effective grid-No.1-to-cathode-circuit resistance (each gun) . . . . . 0.75 max. MΩ

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

[a] For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.

[b] For curve, see *Group Phosphor - P22 - New Rare Earth (Red), Sulfide (Blue & Green)* at front of this section.

[c] For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.

[d] Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

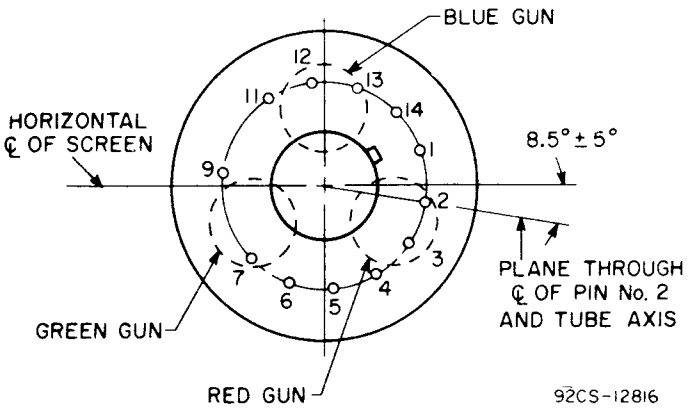
**X-RADIATION WARNING**

Because the 22UP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 22UP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

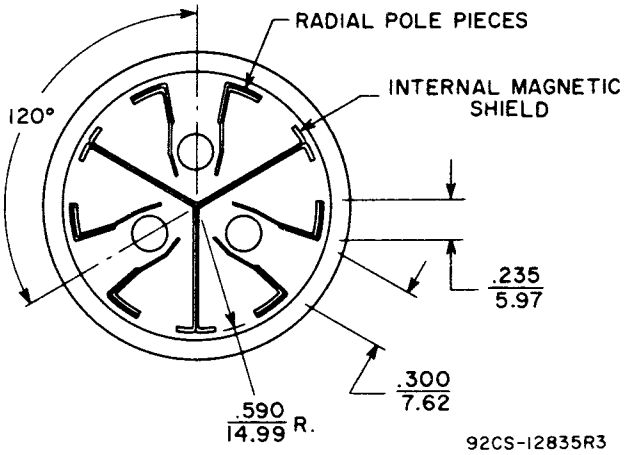
**BASE SPECIFICATION – JEDEC No. 14BE**

Pin 1: Heater
Pin 2: Cathode of Red Gun
Pin 3: Grid No.1 of Red Gun
Pin 4: Grid No.2 of Red Gun
Pin 5: Grid No.2 of Green Gun
Pin 6: Cathode of Green Gun
Pin 7: Grid No.1 of Green Gun
Pin 9: Grid No.3
Pin 11: Cathode of Blue Gun
Pin 12: Grid No.1 of Blue Gun
Pin 13: Grid No.2 of Blue Gun
Pin 14: Heater
Cap: Anode (Grid No.4, Screen, Collector)
C: External Conductive Coating

## BOTTOM VIEW OF BASE




## LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS




## NOTES FOR DIMENSIONAL OUTLINE

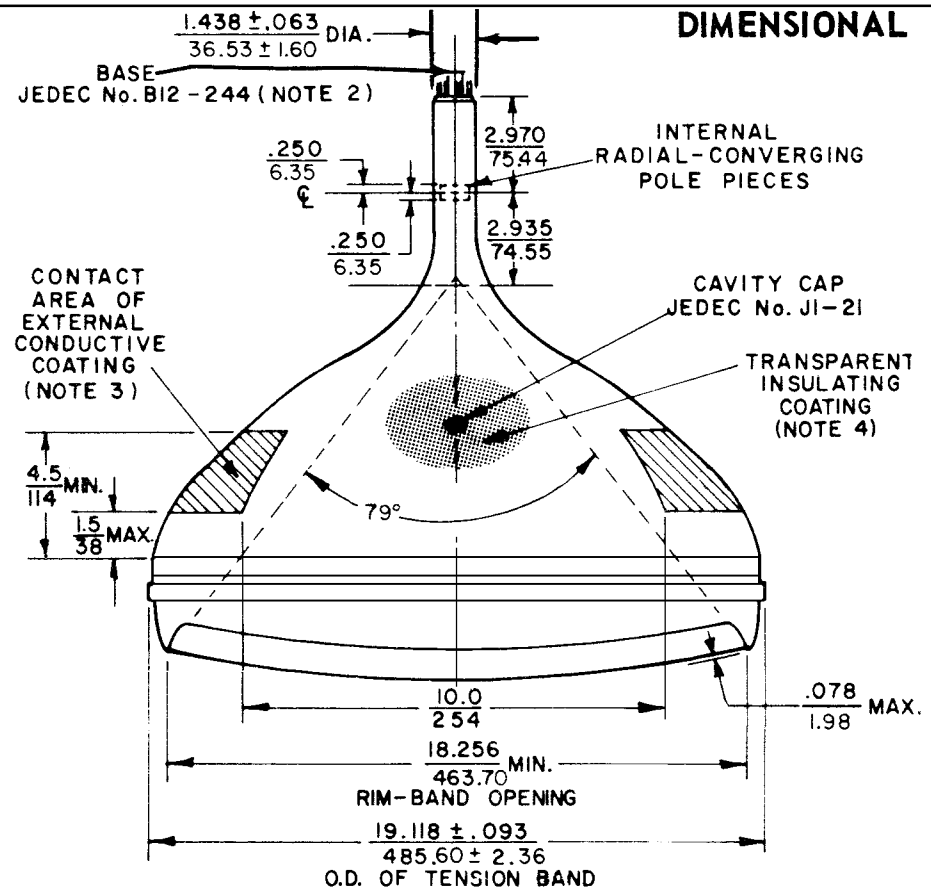
**Note 1:** With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

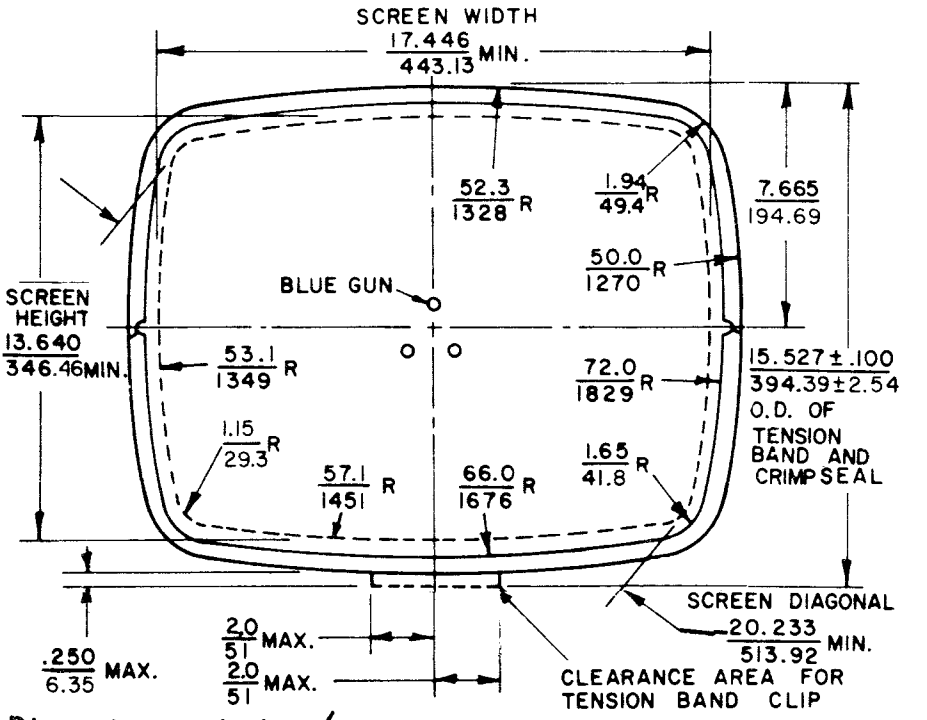
**Note 2:** Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

**Note 3:** The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

**Note 4:** To clean this area, wipe only with soft, dry, lintless cloth.

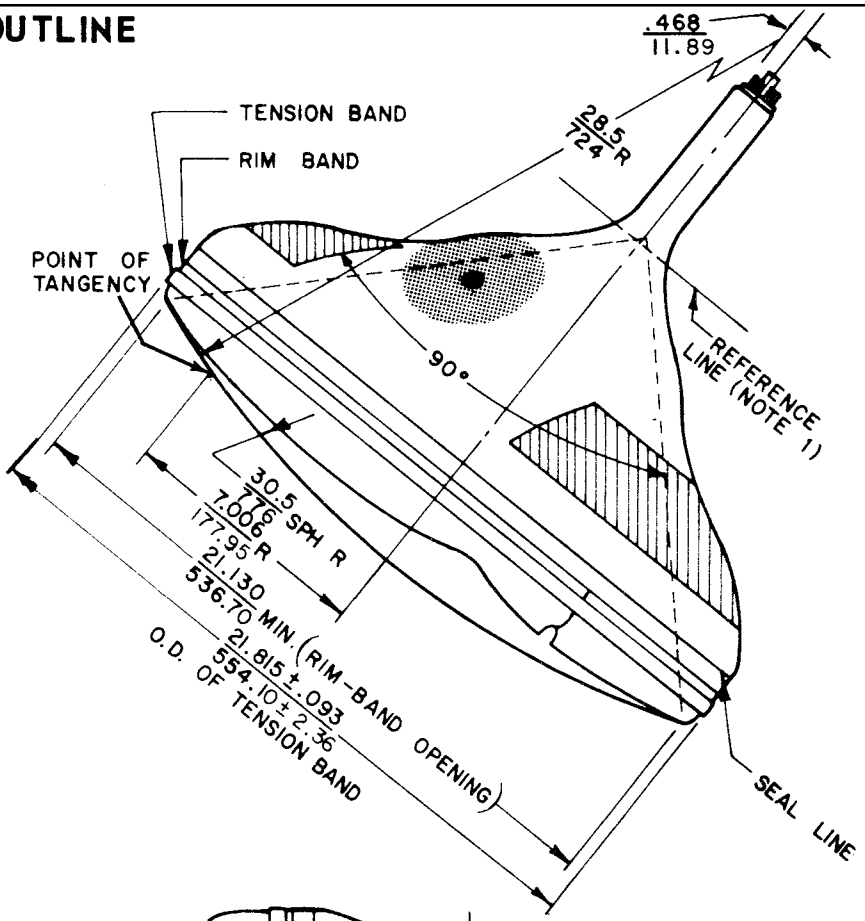
## DIMENSIONAL

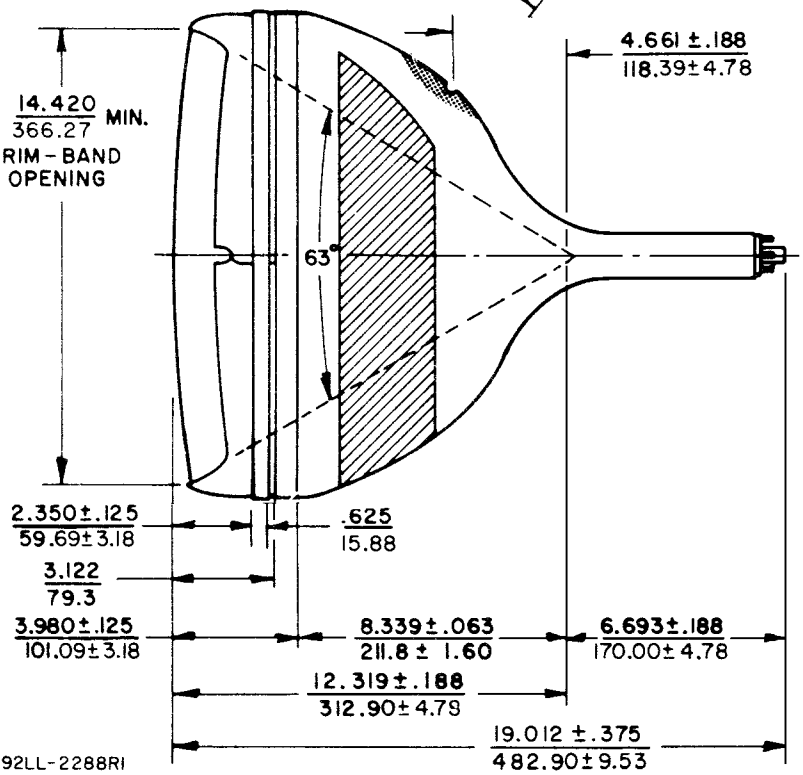


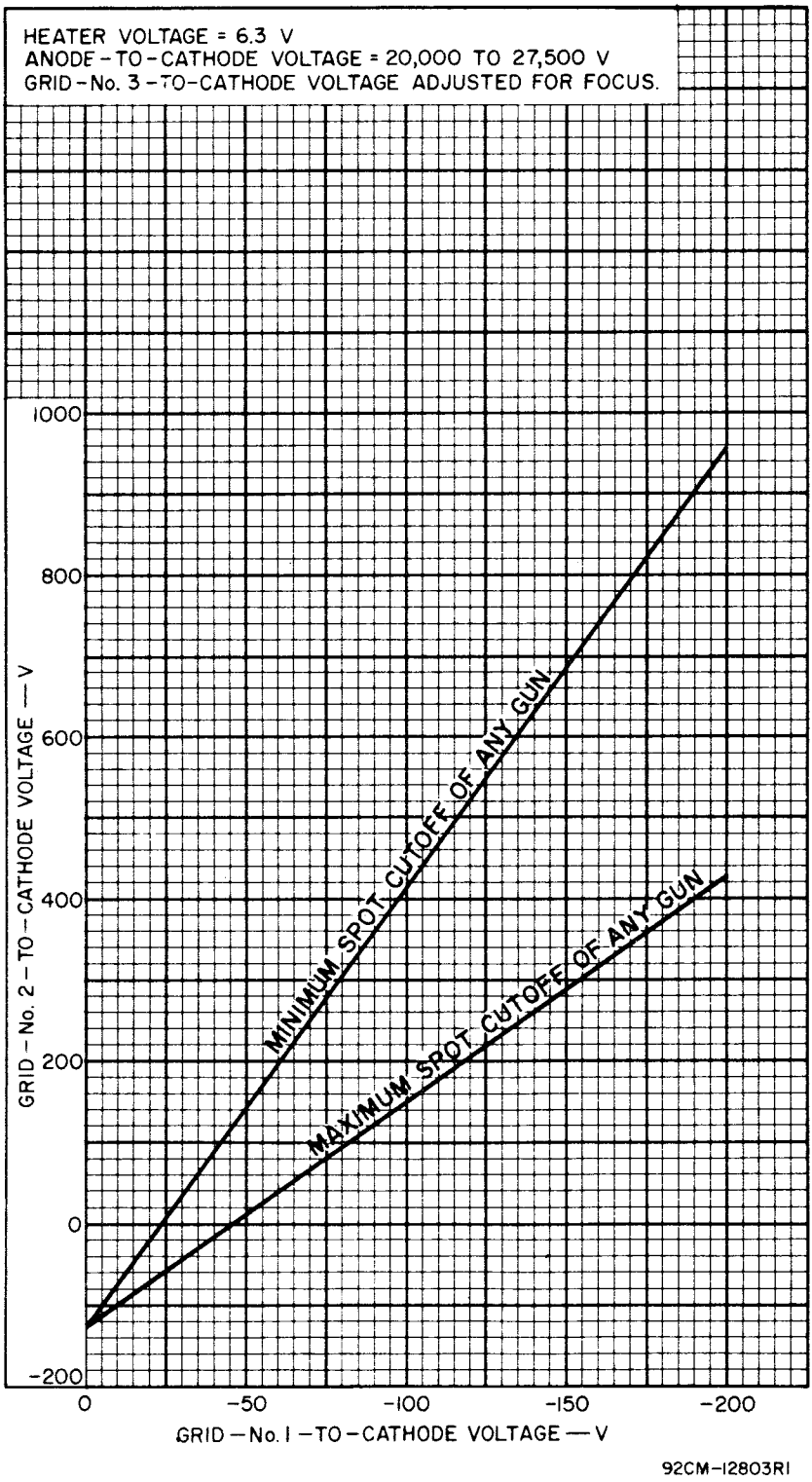

Dimensions in Inches/mm

## OUTLINE


.468
11.89
TENSION BAND
RIM BAND
28.5
724 R
POINT OF
TANGENCY
90°
REFERENCE
LINE (NOTE 1)
30.5
776
SPH R
7.006
177.95 R
21.130
536.70 MIN. (RIM-BAND OPENING)
21.815 ± .093
554.10 ± 2.36
O.D. OF TENSION BAND
SEAL LINE


14.420
366.27 MIN.
RIM-BAND
OPENING
4.661 ± .188
118.39 ± 4.78
63°
2.350 ± .125
59.69 ± 3.18
.625
15.88
3.122
79.3
3.980 ± .125
101.09 ± 3.18
8.339 ± .063
211.8 ± 1.60
6.693 ± .188
170.00 ± 4.78
12.319 ± .188
312.90 ± 4.79
19.012 ± .375
482.90 ± 9.53
92LL-2288RI

## CUTOFF DESIGN CHART

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