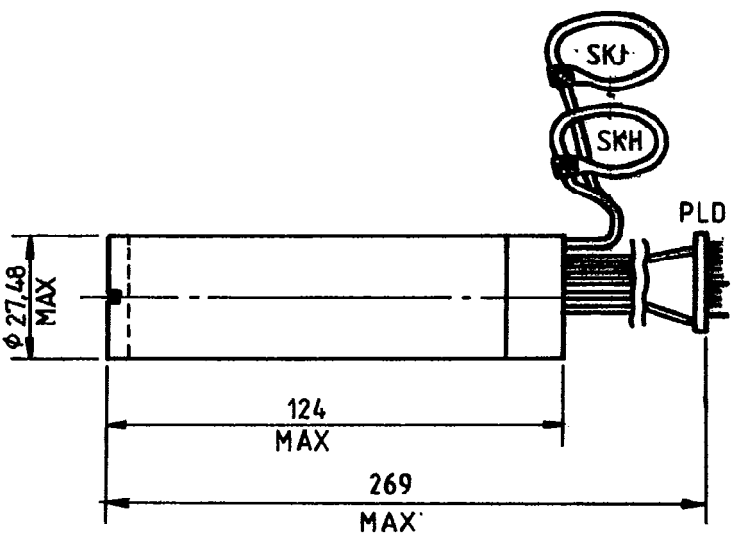


BRITISH STANDARDS INSTITUTION 2, PARK STREET, LONDON. W1A 2BS. SPECIFICATION AVAILABLE FROM:-AS SHOWN IN PD 9002, CECC 00 200 AND RANK BRIMAR LIMITED, GREENSIDE WAY, MIDDLETON, MANCHESTER, M24 1SN. TELE: 061-681-7072. TELEX: 665326	BS CECC 11001-044 Issue 1. May 1990  Page 1 of 32 pages
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH BS CECC 11000 : 1980	MANUFACTURER'S TYPE NUMBER: B0201-S6
Outline and dimensions Third angle projection  All dimensions in millimetres. For detail dimensions and base connections see Appendix B. Marking information See Clause 5.	SEE PD 9002 AND CECC 00 200 For ordering information see Clause 6. MINIATURE HIGH RESOLUTION CATHODE RAY TUBE PACKAGE. Deflection: Magnetic Focus: Electrostatic Screen Dia: 19mm Phosphor: S6(Jedec P53) Colour: Yellowish-green Persistence: Medium Faceplate: Fibre Optic Tube and deflection coils encapsulated in a mu-metal shield. WITH ADDITIONAL ASSESSMENT

DATA (not for inspection purposes)

1. Mechanical

Mounting position	Unrestricted
Mass	260g max.

2. Environmental

Operating temperature range	-40°C to +90°C
Shock	Peak acceleration 981m/s ² , half sine wave, Pulse duration 6ms applied in 3 directions. DATA CONTINUED ON NEXT PAGE.

Refer to Qualified Products List PD 9002 and/or CECC 00 200 for details of
manufacturer's approved to this specification.

Data (not for inspection purposes) continued

2. Environmental (continued)

- Bump 1000 bumps in each of 3 specified planes Peak acceleration 392 m/s².
- Vibration At all significant resonant frequencies, in three specified directions, sinusoidal motion at 9.8 m/s², duration 10⁵ or 10⁶ cycles as appropriate.
- Also at swept frequencies 5 Hz to 5 kHz sinusoidal motion at 49 m/s² in 3 specified directions for a total duration of 30 hours.
- Damp heat 40° C at R.H. 95% for 4 days.
- Mould growth BS 2011, Part 2. IJ 1977 (IEC 68-2-10,1984) Exposure 28 days.

3. Limiting Values (absolute maximum rating system IEC 134)

	<u>Min</u>	<u>Max</u>	<u>Units</u>
Heater voltage (Vh)	5.7	6.9	V
Final anode voltage (Vg ⁴)	6.0	10.0	kV
Focus anode voltage (Vg ³)	500	1500	V
First anode voltage (Vg ²)	200	600	V
Intensity modulator electrode negative voltage (Vg ¹)	1	200	V
Intensity modulator electrode positive voltage (Vg ¹)	modulator must never become positive w.r.t. cathode.		
Heater to cathode voltage, positive and negative	-	200	V
Intensity modulator electrode cathode circuit resistance	-	1.5	M ohm
Average cathode current over 100 ms with duty cycle greater than 25%.		150	µA

4. Operating conditions and typical characteristics (not for inspection purposes)

When the tube is operated under the conditions given below, the characteristic values which follow them are attainable.

Vh = 6.3 V; Vg 2 = 300 V; Vg4 = 7.5 kV.

	<u>Min</u>	<u>Max</u>	<u>Units</u>
Heater current	270	330	mA
Intensity modulator cut-off voltage (Vg1)	-30	-70	V
Focus anode voltage (Vg3)	1000	1400	V
Resolution (spot diam to ½ power level)	-	0.025	mm
Useful screen dimensions	Ø19	-	mm

5. Marking The following shall be clearly and durably marked on the tube and primary pack.

1. Manufacturer's type number
2. Manufacturer's code
3. Date code
4. BS-CECC 11001- 044
5. Manufacturer's serial number
6. NATO stock number if applicable

Special marking relating to hazards. The packaging for each device shall contain a warning of hazards in respect of handling, implosion and X-rays.

6. Ordering Information

Orders for this cathode ray tube shall contain the following minimum information.

1. Quantity
2. Manufacturer's type number
3. BS-CECC 11001-044 and where applicable the NATO Stock Number

Any special requirements and packaging instructions shall be included in the order.

7. Related documents

BS 6001	Sampling procedures and tables for inspection by attributes
BS 9000	General requirements for a system for electronic components assessed quality
BS-CECC 11000	Cathode ray tubes: generic specification
CECC 00200	Qualified products list
IEC 67	Dimensions of electronic tubes and valves
IEC 68	Basic environmental testing procedure
IEC 100	Methods for the measurement of direct interelectrode capacitance of electronic tubes and valves
IEC 134	Rating systems for electronic tubes and valves and analogous semiconductor devices
IEC 410	Sampling plans and procedures for inspection by attributes
PD 9002	BS9000 Component Selection Guide

8. Structural similarity

Not applicable

9. X-radiation

All high voltage devices operating at voltages above 5 kV produce progressively harder X-rays as the voltage is increased when current is drawn. The device envelope usually provides only limited protection and further shielding may be required. This device complies with the requirements of BS 415 (1979) and Health and Safety Statutory Instrument (1985) No. 1333.

10. Additional information

1. The tube should be operated at its minimum useful brightness in order to prevent damage to the screen material. There is a possibility of a rapid burn on the screen if the spot is allowed to remain stationary.
2. Faceplate flatness, 10 fringes D line.
3. The deflection coils are set for correct orientation of the Y-axis display to the shield slot and are secured to maintain this position. Tube and coils are encapsulated in a magnetic shield.

TEST CONDITIONS AND INSPECTION REQUIREMENTSGROUP A - Lot by Lot

General test conditions (unless stated otherwise for particular tests)

Heater voltage (V_h) = 6.3V.

Final anode voltage (V_{g4}) = 7.5 kV.

Focus anode voltage (V_{g3}) = adjust as required.

First anode voltage (V_{g2}) = 300 V.

Intensity modulator electrode voltage (V_{g1}) = adjust as required.

Direction of deflection: Viewing the face of the tube, with the locating slot to the right, the deflection shall be as follows. Orange lead positive, spot deflected downward. Black lead positive, spot deflected left.

Raster details: 625 line T.V. standard or 312 line non-interlaced at a field repetition frequency of 50 Hz. It must be possible to overscan.

Pulse conditions: Rise and fall times within 10% of pulse duration. Droop within 10% of pulse amplitude.

All electrode voltages are with respect to cathode unless otherwise stated.

Pre-heating: Apply V_h only for 2 minutes from each cold start.

Samples submitted to tests marked (D) shall not be accepted for release under BS9000 (See 20.2 of BS9000 Part 1:1981).

All tests are non-destructive.

AQL given in %

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
SUB-GROUP A1						100%	
- Visual inspection	4.3	Duration = 24 h min.	See 4.3				
- Non operating endurance	4.9.1						
- Dimensions major	4.4	Inspection drawing Appendix B.	As inspection drawing Group A Dimensions				

SUB-GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Gas content coefficient	4.6.1	Vg2 = 200 V Vg3 = -40 V Vg4 = 0 V Adjust Vg1 for Ik = 400 μ A Measure Ig3 Calculate $\frac{Ig3}{Ik}$			0.2 μ A/ μ A		
- Intensity modulator electrode cut-off voltage	4.6.2		-30	-70	V		
			(record value)				
- Cathode emission (half cut-off)	4.6.3	Minimum cathode factor K = 2. Focused raster to fill useful screen area.	Calculated Ik (min) = $\frac{K(\text{cut-off voltage})^{3/2}}{\sqrt{128}}$				
- Quality of fluorescent screen and faceplate	4.6.10	Defocused overscanned raster. Adjust Vg1 for convenient screen luminance. Useful screen area.	As blemish specification Appendix A.				
			Ø19		mm		
- Flashover	4.6.7 Method A	Pre-heat cathode for 120 s Screen horizontal and uppermost. Shield at Cathode potential. Vg4 = 10 KV Vg3 = Adjust for focus Vg2 = 600 V Raster over useful screen area. Adjust Vg1 to -200V Tap tube neck for 15 s	Performance requirements as in 4.6.7 Method A				
- Stray emission	4.6.6	Pre-heat cathode for 120 s Screen vertical. Shield at cathode potential. Vg4 = 10 kV Vg3 = Adjust for focus Vg2 = 600 V Vg1 = -200V Switch off deflection coil current and view for 30 s	Performance requirements as in 4.6.6				

SUB GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Microphony		Adjust Vg1 for just visible focused raster over useful screen area. Tap tube neck for 10s at 4 taps per second. Use hammer similar to design shown in T.M.4.6.6.					
- Mechanical spot displacement	4.6.5 Method B	Distance from geometric centre of screen.	-	1	mm		
-Blooming		Display raster size to approximately fill screen with corners visible. Using a microscope with graticule, observe one corner of raster while adjusting Vg1 from cut-off to 100µA Ik.					
- Focus voltage		At the undeflected spot position, display a 1µs pulsed spot at a 50 Hz refresh rate and adjust pulse amplitude for Ik=50µA. Adjust focus voltage (Vg3) for optimum focus and record.	1000	1400	V		
- Astigmatism of deflected spot		As Appendix C. Axis perpendicular to locating slot. Set pulsed spot conditions as in preceding focus voltage test. Measure and calculate astigmatism ratio for both spot positions.	-	1.7	Ratio		

SUB GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Luminance characteristics	4.6.4	Display a raster size 19mm (X-axis) by 14.6mm (Y-axis). Photometer 240mm from screen centre. Set focus as previously measured and recorded in Focus voltage test. Adjust Vgl for a luminance of 300 cd/m². Measure Vgl and calculate Vgl (drive).	-	25	V		
- Resolution	4.6.14.6	Display a pulsed line across the X-axis. Writing speed 0.36mm/μs. P.R.F. 50 Hz. Set Vgl (drive) and Focus as in Luminance characteristics test. Measure and record half power line width at screen centre (undeflected spot position) and 6.5mm left of centre.	-	0.025	mm		

SUB GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Orthogonality		As Appendix D. Angle between axes.	89	91	degrees		
- Orientation of Y-axis to shield slot.		As Appendix E. Alignment error angle.	-	+1	degrees		
- Coil sensitivity		Measure current required to deflect a focused spot 8mm from centre in each direction of both X and Y axes. X axis Y axis	600 200	800 270	mA mA		
SUB-GROUP A2	Applicable Sub-Group A2 tests performed 100% in Sub-Group A1.						
SUB-GROUP A3						S4	6.5
- Heater current	4.6.8	Apply $V_h=6.3V$ only	270	330	mA		
- Heater to cathode leakage	4.6.9	Set $V_h=7.0V$					
(1) Heater positive w.r.t. cathode		V_h-k (heater positive) = 200V	-	40	μA		
(2) Heater negative w.r.t. cathode		V_k-h (heater negative) =200V	-	40	μA		
- Intensity modulator electrode negative current.	4.6.12 Method B	$R_{mod} = 10 M \text{ Ohms}$	-	5	μA		
- Electrode leakage current	4.6.11	General test conditions for focused raster and then set V_{gl} at -200V Measure I_{g3} Measure I_{g4}	- -	+10 5	μA μA		

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Coil inductance		No voltages on tube electrodes. Measure at 1kHz X-axis coil Y-axis coil	108 1116	132 1364	μ H μ H		
- Coil resistance		No voltage on tube electrodes. X-axis coil Y-axis coil	1.8 16.2	2.2 19.8	Ohms Ohms		
- Pattern distortion		As Appendix F Line deviation	-	0.1	mm		
- Deflection linearity		As Appendix G Linearity in X and Y axes.	-	± 1	%		
Remaining applicable Sub-Group A3 tests performed 100% in Sub-Group A1.							

GROUP B - Lot by Lot

General test conditions - As for Group A

Only tests marked (D) are destructive

AQL: given as %

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Dimensions major	4.4	Not applicable, performed 100% in Sub-Group A1.				S4	4.0