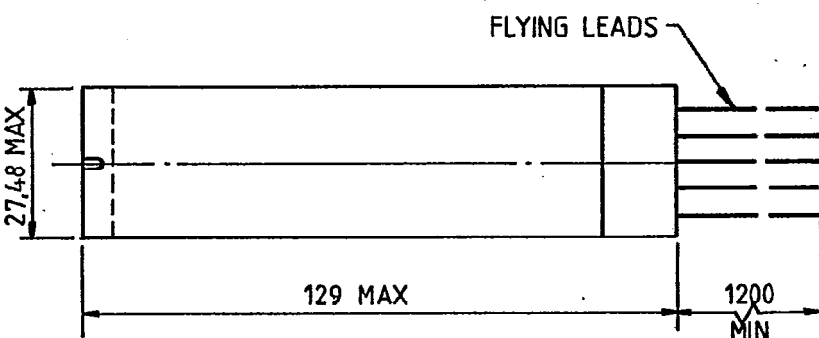


BRITISH STANDARDS INSTITUTION 2, PARK STREET, LONDON. W1A 2BS	BS CECC 11001-037 Issue 1 AUG 1985.
Specification available from:- AS SHOWN IN PD 9002, CECC 00 200 AND THORN EMI Brimar Limited, GREENSIDE WAY, MIDDLETON, MANCHESTER. M24 1SN Tel: 061 681-7072. Telex: 665326	Page 1 of 32 Pages
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH BS CECC 11000 : 1980	MANUFACTURER'S TYPE NUMBER: 02F/1101
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: 19 mm Phosphor: A5 (Jedec P46) Colour: Yellow- Green Persistence: Very short Faceplate: Fibre optic Tube and deflection coils encapsulated in a mu-metal shield FULL ASSESSMENT + ADDITIONAL ASSESSMENT

DATA (not for inspection purposes)

1. Mechanical

Mounting position
Mass

Unrestricted
260g max

2. Environmental

Operating temperature range
Shock

-40°C to +70°C
Peak acceleration 981 m/s², 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 manufacturers 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/s ² .
Vibration	At all significant resonant frequencies, in three specified directions, sinusoidal motion at 9.8 m/s ² , duration 10 ⁵ or 10 ⁶ cycles as appropriate. Also at swept frequencies 5 Hz to 5 kHz sinusoidal motion at 49 m/s ² in 3 specified directions for a total duration of 30 hours.
Driving rain	Eight shower heads each delivering 455 litres per hour, at 207 kN/m ² water pressure, for a one hour period.
Mould growth	BS 2011, Part 2. 1J 1977 (IEC 68-2-10,1968) Exposure 28 days.
Robustness of terminals	BS 2011, Part 2. 1U 1977 (IEC 68.2.21,1975) Test Ua1 tensile load 2 kg, test Ub 10 bends load 1 kg.

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 (Vg4)	6.0	8.5	kV
Focus anode voltage (Vg3)	500	1500	V
First anode voltage (Vg2)	200	500	V
Intensity modulator electrode negative voltage (Vg1)	1	200	V
Intensity modulator electrode positive voltage (Vg1)	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	MΩ
Average cathode current over 100 ms		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	280	320	mA
Intensity modulator cut-off voltage (Vg1)	-30	-70	V
Focus anode voltage (Vg3)	1000	1400	V
Resolution (spot diam to 50% level)	-	0.025	mm
Useful screen dimensions (Raster size)	17.5x6.5	-	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 11001-037
5. Manufacturer's serial number
6. NATO stock number if applicable

Special marking relating to hazards. Each tube and package 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 11001-037 and where applicable the NATO Stock Number 5960-99-038-0770

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 more dangerous X-rays as the voltage is increased. The device envelope usually provides only limited protection and further shielding may be required.

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. The tube should be shielded from magnetic fields which can be detrimental to its performance.
3. Faceplate flatness, 10 fringes D line.
4. The alignment of the deflection coils is set for optimum display, and the coils are secured to the tube to maintain this position. Tube and coils are encapsulated in a magnetic shield.

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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 nA/ μ A		
-Intensity modula- tor electrode. cut-off voltage.	4.6.2.		-30	-70	V		
			(record value)				
-Cathode emission	4.6.3.	Minimum cathode factor K = 2. Defocused overscanned raster.	Calculated Ik (min) = $K(\text{cut-off voltage})^{3/2}$				
-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.				
			17.5		mm		
			X 6.5				
		Non-uniformity of bright- ness. Visual inspection.	No significant variation over useful screen area.				
-Stray emission	4.6.6.	Pre-heat cathode for 120 s. Screen horizontal and uppermost. Shield at cathode potential. Vg4 = 10 kV. Vg3 = Adjust for focus Vg2 = 600 V. Vg1 = -150 V. Switch off deflection coil current.	Performance requirements as in 4.6.6.				
-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 -150V. Tap tube neck for 15 s.	Performance requirements as in 4.6.7. Method A.				

SUB-GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
-Microphony		Pre-heat for 120 s. Adjust Vg1 for just visible focused raster over useful screen area. Tap tube neck for 10 s at 4 taps per second. Use hammer similar to design shown in 4.6.6.					
-Peak spot luminance	4.6.29	Method as TM 4.6.29 except display a focused spot. Luminance = 13800 cd/m ² . Measure Vg1. Calculate and record Vg1 (drive). Measure Vg3 focus voltage.	- 1000	12 1400	V V		
-Resolution (Spot diameter at 50% of peak amplitude)	4.6.14.6	Undelected focused spot. Luminance = 13800 cd/m ² .		0.025	mm		
-Astigmatism of deflected spot.		As Appendix C. Axis perpendicular to locating slot. Luminance = 13800 cd/m ² .		1.7	Ratio		
-Mechanical spot displacement.	4.6.5. Method B	Distance from geometric centre of screen.		2.0	mm		
Orthogonality		As Appendix D. Calculate angle θ between axes.	89	91	degrees		
-Orientation of Y-axis to shield.		As Appendix E. Calculate alignment error angle ϕ .	-	1	degree		
-Coil sensitivity		Measure the current required to deflect a focused spot 5 mm from centre in each direction of both axes.	-	560	mA		
SUB-GROUP A2		Applicable Sub-Group A 2 tests performed 100% in Sub-Group A1.					

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
SUB-GROUP A3						S4	6.5
- Heater current	4.6.8	Apply $V_h = 6.3$ V only	280	320	mA		
- Heater to cathode leakage	4.6.9	$V_h = 7.0$ V					
(1) Heater positive w.r.t. cathode		V_h -k (heater positive) = 200 V		15	μ A		
(2) Heater negative w.r.t. cathode		V_k -h (heater negative) = 200 V		15	μ A		
- Intensity modulator electrode negative current	4.16.12 Method B	$R_{mod} = 10$ M Ω		5	μ A		
- Electrode leakage current	4.6.11	$V_h = 7.0$. $V_{g4} = 7.5$ kV. Focused raster Measure I_{g3} Measure I_{g4}		3 3	μ A μ A		
- Coil inductance		No voltages on tube electrodes Measure at 1kHz X coil Y coil	130 112	160 138	μ H μ H		
- Coil resistance		No voltages on tube electrodes X coil Y coil	1.62 1.53	2.02 1.91	Ω Ω		
- Pattern distortion		As Appendix F. Line deviation		0.10	mm		
- Deflection linearity		As Appendix G. Deflection linearity	-	2	mA/mm		

Remaining applicable Sub-Group A3 tests performed 100% in Sub-Group A1

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General test conditions - as for Group A

Only tests marked (D) are destructive

AQL: given in %

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.					

Group C - PERIODIC

General test conditions - as for Group A

Only tests marked (D) are destructive

AQL: given in %

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
SUB-GROUP C1	Applicable Sub-Group C1 tests performed in Sub-Groups A1 and A3						
SUB-GROUP C2	Not Applicable						
SUB-GROUP C3	At yearly intervals. The sample size and acceptance criterion shall be as in 3.4 and 4.9.2. of CECC 11000 as appropriate						
-Mass -Heater modulation	4.6.31	Focused raster just visible non-synchronised with heater supply frequency of 50 Hz approx.		260	g		
			No intensity modulation				

SUB-GROUP C3 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Capacitances	2.2 - IEC 100	Modulator electrode to all. Keep modulator lead separate from other leads. Cathode electrode to all. Keep cathode lead separate from other leads. Focus electrode to all. Keep focus lead separate from other leads.		12	pF		
- Pre-Operating endurance test				8	pF		
- Luminance characteristic	4.6.4	Focused raster size 10 x 10 mm. Adjust Vg1 for Ik = 50µA. Measure screen luminance Measure Vg1	Record Record		cd/m ² V		
- Operating endurance (D)	4.9.2	As for luminance characteristics above. Ik = 50µA throughout test. Duration = 1000 h min.					
- Post Operating endurance tests							
Luminance characteristics	4.6.4	Refer to Pre-Operating endurance test. Focused raster, size 10x10 mm. Adjust Vg1 to initial recorded value. Measure luminance and calculate change from initial recorded value. Adjust Vg1 to obtain initial recorded luminance value. Calculate change in Vg1 from initial recor- ded value.		25	%		
				5	V		