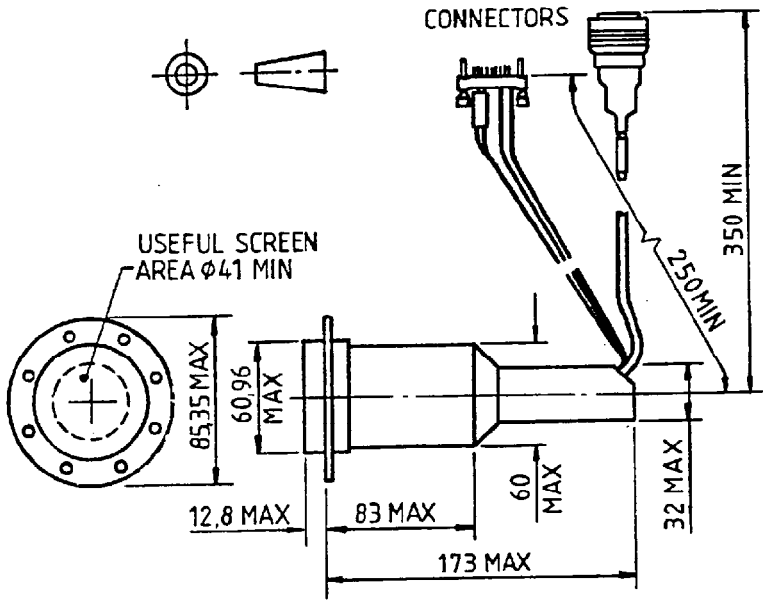


BRITISH STANDARDS INSTITUTION 2, PARK STREET, LONDON, W1A 2BS	BS CECC 11001-038 ISSUE 2: JAN 1991
Specification available from:- AS SHOWN IN PD 9002, CECC 00 200 AND RANK BRIMAR LIMITED, GREENSIDE WAY MIDDLETON, MANCHESTER M24 1SN TEL: 061-681 7072 Telex: 665326	 Page 1 of 33 Pages
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH BS CECC 11000 : 1980	MANUFACTURER'S TYPE NUMBER 05E/50475S3
Outline and dimensions Third angle projection  All dimensions in millimeters. For detail dimensions 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 Deflection: Magnetic Focus: Electrostatic Useful screen: 41mm dia. Phosphor: S3 (Jedec P43) Persistence: Medium short Colour: Yellowish-green Faceplate: Optically polished optical quality glass. Tube and deflection coil encapsulated in a magnetic shield. FULL ASSESMENT + ADDITIONAL ASSESSMENT.

Data (Not for inspection purposes)

1. Mechanical

Mounting position
 Mass

Unrestricted
 0.8 kg (Max)

2. Environmental

Storage temperature range.
 Operational temperature range.

-46°C to +71°C.
 -46°C to +79°C

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)

Vibration (Random)	10 Hz to 500 Hz	$0.1 \text{ g}_n^2/\text{Hz}$
	500 Hz to 2000 Hz	$0.1 \text{ g}_n^2/\text{Hz}$ falling to
		$0.01 \text{ g}_n^2/\text{Hz}$ at 2 kHz
<u>Shock</u> ($1/2$ Sine)	Peak acceleration	392 m/s^2
	Time duration	11 ms
<u>Bump</u> ($1/2$ Sine)	Peak acceleration	118 m/s^2
	Time duration	16 ms
<u>Air Pressure</u>	Increased	1900 mbars
	Low	500 mbars

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

	Min.	Max.	Units
Heater voltage (Vh)	5.7	6.9	V
Heater to cathode, positive voltage	-	200	V
negative voltage	-	200	V
Intensity modulator electrode cathode circuit resistance		1.5	M Ω
Intensity modulator electrode negative voltage (Vg1)	1	200	V
Intensity modulator electrode positive voltage (Vg1)	modulator must never become positive w.r.t. cathode		
First anode voltage (Vg2)	200	600	V
Second (focus) anode voltage (Vg3)	700	1900	V
Third (final) anode voltage (Vg4)	4.5	8.5	kV
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 = $6.3 \text{ V} \pm 0.1 \text{ Vdc}$; Vg2 = 300 V; Vg4 = 8 kV; Cathode and collar at earth.

	Min.	Max.	Units
Heater current (Ih)	270	330	mA
Intensity modulator cut-off voltage (Vg1)	-30	-70	V
Focus anode voltage (Vg3)	1320	1545	V
First anode current (Ig2). (May increase to $\pm 18 \mu\text{A}$ with ageing)	-	± 10	μA
Useful screen dimension	41 dia		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 11001-038
5. Manufacturer's serial number
6. NATO stock number if applicable
7. Modification strike label; Unit ident code label; Part number label. 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 these cathode ray tubes shall contain the following minimum information:

1. Quantity
2. Manufacturer's type number
3. BS-CECC 11001-038 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 of assessed quality.
BS-CECC 11000	Cathode ray tubes: generic specification
CECC 00 200	Qualified products list
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
PD 9002	BS 9000 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.

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10. Additional information

1. The precautions taken in manufacture reduce the possibility of spontaneous implosion to a minimum, but any additional stress due to mishandling considerably increases the risk of implosion; such implosion may occur immediately or be delayed.
2. 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.
3. The tube should be shielded from magnetic fields which can be detrimental to its performance.

TEST CONDITIONS AND INSPECTION REQUIREMENTSGROUP A - Lot by Lot

General test conditions (unless stated otherwise for particular tests)

Heater voltage (Vh) = 6.3 V.

First anode voltage (Vg2) = 300 V.

Final anode voltage (Vg4) = 8 kV.

Intensity modulator electrode negative voltage (Vg1) = adjusted as required.

Focus anode voltage (Vg3) = adjusted as required.

Collar at earth potential.

Raster details: 312 line raster non-interlaced with 50 Hz field rate and flyback blanking. Active lines 287. Raster size 32.8 mm x 24.6 mm. Writing speed 0.63 mm/μs.

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

Pre-heating: Apply Vh only for 2 minutes, before any non-consecutive test.

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

Astigmatism correction is not applied.

Samples submitted to tests which are marked (D) shall not be accepted for release (see 20.2 of BS 9000 part 1).

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	As 4.3 plus connector terminations	See 4.3				
- Non operating endurance	4.9.1	Duration = 24 h min.					
- Gas content coefficient	4.6.1	Vg2 = 200 V. Vg3 = -40 V. Adjust Vg1 for Ik = 400 μA Measure Ig3 Calculate $\frac{Ig3}{Ik}$		0.2	nA/μA		
- Intensity modulator electrode cut-off voltage.	4.6.2	Visual extinction of spot.	-30	-70	V		
			(record value)				

SUB-GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Cathode emission	4.6.3	Minimum cathode factor K = 2. Overscanned raster. Vg4 = 4 kV Vg3 = 1400 V	Calculated $I_k \min =$ $K(\text{cut-off voltage})^{3/2}$				
- Quality of fluorescent screen and faceplate	4.6.10	Defocused overscanned raster. Adjust Vg1 for convenient screen luminance. Useful screen area. Non-uniformity of bright- ness. Visual inspection.	As blemish specification Appendix A 41 dia.		mm		
- Flashover	4.6.7 Method A	Screen horizontal and uppermost. Vg4 = 10 kV Vg3 = 700 V Vg2 = 600 V Raster over useful screen Area. Adjust Vg1 to -150 V. Tap tube neck for 15 s.	Performance requirements as in 4.6.7 Method A.				
- Stray emission	4.6.6.	Screen horizontal and uppermost. Vg4 = 10 kV Vg3 = 700 V Vg2 = 600 V Vg1 = -150 V Switch off deflection coil current.	Performance requirements as in 4.6.6				
- Microphony		Adjust Vmod 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.	There shall be no dark lines or bars on the screen				
- Mechanical spot displacement	4.6.5 Method B	The undeflected spot to be within a 2.0 mm radius circle concentric with the tube mounting collar.	-	2.0	mm		

SUB-GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Orientation of Y-axis trace to vertical datum line axis		As Appendix C. Calculate alignment error angle ϕ .	-	± 2	degree		
- Luminance characteristics and Resolution (M.T.F.)		See Appendix E. Measure at 1000 cd/m ² Average cathode current Average screen current Focus voltage	- - 1320	200 40 1545	μ A μ A V		
		MTF at 250 cycles/raster width Screen positions A, B, D & E	44	-	%		
		MTF at 350 cycles/raster width Screen positions A, B, D, E Screen position C Focus voltage	25 42 1320	- - 1545	% % V		
- Luminance variation		See Appendix F. Luminance variation across raster width. Rate of luminance change per mm across raster width.		20 2	% %		
- Orthogonality		As Appendix D. Angle between axes.	89.0	91.0	degrees		
- Coil sensitivity		Measure d.c. current required to deflect a focused spot from centre in each axis for distance stated below. Direction of deflection facing tube face: Connector PL1 Pin 12 + ve deflects left. Pin 16 + ve deflects down.					
X-axis		20 mm deflection to left. 20 mm deflection to right.	850 850	1050 1050	mA mA		
Y-axis		20 mm deflection upwards. 20 mm deflection downwards.	155 155	200 200	mA mA		

SUB-GROUP A1 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Magnetic shield to front collar continuity		Measure resistance between magnetic shield and tube front collar. Measure before fitting connectors.	-	0.5	Ω		
SUB-GROUP A2	Applicable Sub-Group A2 tests performed in Sub-Group A1						
SUB-GROUP A3						S4	6.5
- Heater current	4.6.8	Apply $V_h = 6.3$ V only.	270	330	mA		
- Heater to cathode leakage	4.6.9.						
(1) Heater positive w.r.t. cathode		V_h-k (heater positive) = 200 V		40	μA		
(2) Heater negative w.r.t. cathode		V_k-h (heater negative) = 200 V		40	μA		
- Intensity modulator electrode negative current	4.6.12 Method B	$R_{mod} = 10$ M Ω		5	μA		
- Electrode leakage current	4.6.11	$V_{g4} = 10$ kV, $V_{g3} = 700$ V. $V_{g2} = 600$ V, $V_{g1} = -150$ V. Measure I_{g2} Measure I_{g3} Measure I_{g4}		± 5 ± 10 5	μA μA μA		
- Coil inductances		Measure at 1 kHz X scan coil Y scan coil	145 4.95	165 5.5	μH mH		
- Coil resistances		X scan coil Y scan coil		0.95 25	Ω Ω		

SUB-GROUP A3 CONTINUED

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Inter-coupling of X-coil to Y-coil		Measure magnetic inter- coupling, at 40 kHz, of the X-coil on to the Y-coil in terms of decibels.		- 40	dB		
		$dB = 20 \log \frac{V_1}{V_2}$					
		where V1 = Y-coil induced voltage					
		and V2 = X-coil applied voltage = 1.0V.					
- X-coil self capacitance		See Appendix H.		150	pF		
<u>GROUP B</u> - Lot by Lot General test conditions - as for Group A <u>Only tests marked (D) are destructive</u> AQL : given in %							
INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
			MIN	MAX	UNITS	IL	AQL
- Dimensions, major	4.4	See inspection drawing Appendix B.				S4	4,0
			As inspection drawing, Group B dimensions				

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-Group 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				0.8	Kg		
- Heater modulation	4.6.31	Focused raster just visible non-synchronised with heater supply frequency of 50 Hz approx.	No intensity modulation				
- Capacitances	2.2 IEC 100	Measure before fitting connectors. Modulator (Vg1) electrode to all. Keep modulator lead separate from other leads.	-	12	pF		
		Cathode electrode to all. Keep cathode lead separate from other leads.	-	8	pF		
- Damp heat	4.8.3	Duration 4 days.	See 4.8.3				
- Operating endurance (D)	4.9.2	Focus raster. Maintain Ik at initial value measured for luminance of 220 cd/m² in Sub-Group A1. Duration 2200 h min.					