

Specification DENEX 250TN

(Status: July 2008)

Line	Parameter	Value	Comments
1	Active Area	250 x 500 mm ²	500 mm (Horizontal) x 250 mm (Vertical) Size of the free space of electrode frames; Neutron sensitive area: ~ 480mm x 230mm
2	Spatial Resolution (FWHM) :	~ 2mm x 2mm	~ 2.5 mm, ~ 200 pixels (Horizontal); ~ 2.0 mm, ~ 125 pixels (Vertical)
3	Linear Maximum Count Rate (Global)		~ 10 ⁸ /s (this high maximum count rate of this delay line based detector can be achieved only if an adequate data acquisition system as specified as outlined in Chapter 5.3 of this appendix)
4	Linear Maximum Count Rate (per Pixel)		~ 3 x 10 ⁴ /(cm ² s): This local count rate results in only minor changes of the pulse height spectrum and is thus regarded as not critical. ~ 10 ⁵ /(cm ² s): This local count rate results in significant changes of the pulse height spectrum and may only be achieved after careful adjustment of the analogue electronics.
5	Detector efficiency at - 2 Å: - 5 Å:	> 50 % > 75 %	i) nominal neutron capture probability ii) electronic detection of every captured neutron assumed (this is almost achieved with this detector type produced by DENEX if the analogue electronics are adjusted properly)
6	Background Signal in the Absence of Neutrons	< 0.1/s (over the whole detector)	This background depends on the surrounding, the analogue electronics and its adjustment. The value presented on the left was measured with the REFSANS prototype detector in the scattering tube of SANS-2 at GKSS while the reactor FRG-1 was operated.
7	Gamma Sensitivity	< 10 ⁻⁸ (for 662 keV (boron based) gamma rays)	This very low value was measured with the REFSANS prototype detector by using a ¹³⁷ Cs-source and an adjustment of the analogue electronics allowing of high detection probability as mentioned in line 5 of this table.
8	Event timing resolution	< 3 μs	This resolution is mainly determined by the electron drift time in the detector gas.
9	Spatial uniformity	< ± 3%	Measurement: Starting from the centre of an uncorrected spectrum and assuming a constant ratio "change in x- or y-position per channel" the relative distortion will not exceed 3%.
10	Temperature Stability in Vacuum	< ± 2°	
11	Pressure in Vacuum Vessel p _v	1000 mbar > p _v > 0 mbar	The detector may be operated in the vacuum vessel at any gas pressure below 1000 mbar.
12	Depth of detection volume	30mm	Limited by drift electrodes
13	Detection gas	³ He: ~1.5 bar CF ₄ : ~1.5 bar	Maximal total detection gas pressure: ~ 4 bar
14	Window material	~ 15 mm	Al-Mg ₃ -alloy; Thickness is still to be optimised.
15	Electronic components inside the detector	Delay lines	
16	Anode wire	Ø ~ 8 μm	Au-coated Tungsten/Rhenium wire
17	Cathode wire	Ø ~ 30 μm	Au-coated Tungsten/Rhenium wire
18	Drift electrodes	Ø ~ 30 μm	Isolated metallic-coating on the window side; Multi-wire electrode on the bottom side.
19	Connector for delay lines signal	BNC, 50Ω	
20	Connector for HV supply	SHV	
21	Valve for pumping and gas filling: □ Manufacturer Type :	Swagelok 6L-ELD8-DDXX	
22	Gas quality	Not measured	The detector housing is heated to ~ 60°C and evacuated for more than 100h before the detection gas is filled in; all detection gases are of high purity (eg.: Purity > 99.997 vol. % (³ He)).
23	delay lines □ number of steps (hor.) □ number of steps (ver.) □ delay per step □ total delay (hor.) □ total delay (ver.)	250 125 ~1.4 ns ~ 350 ns ~ 175 ns	
24	Cathode preamplifiers □ Rise Time □ Power supply □ Gain	≤ 8 ns ± 6V dc 54 dB	
25	Anode and drift electrode HV-filter	max: 6 kV, dc	