Tissue Characterization Consulting

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3D Ultrasound tissue-mimicking quality assurance (QA) phantom

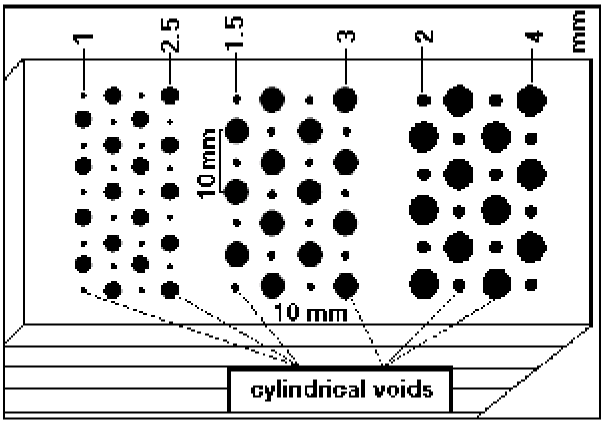
The quality of ultrasound images may be assessed at any organ such as liver or thyroid gland. However, it may be shown that mentioned organs are not adequately sensitive for assessment of the contrast. The contrast ability of a scanner may be simply described as a cyst imaging capability. Axial and lateral resolution combined with slice thickness determine the spatial resolution. The relation between the main lobe and the side lobes determine the spatial contrast resolution.

The cysts are represented in the phantom as the cylindrical scatter free targets arranged as shown by the sketch. The phantom with described targets is very sensitive to the scanner contrast ability.

Quality assurance of a scanner may be performed by repeated regular inspections of a scanner and comparison of the phantom B-images. **The phantom is primarily intended for automatic processing and evaluation of 3D-images by special QA software.**

Essentially the performance of a scanner can be estimated by imaging the different cylindrical targets at various depths. Since the attenuation, speed of sound and frequency dependent backscattering of the phantom is comparable with living tissue, it is a quantitative approach for measurement scanner quality.

PHANTOM SKETCH



Subject to change without notice

+ Patent pending

Model PH160-0.5 + SPECIFICATIONS

Material: Artificial foams
5mm interlaced slices type 1 and 2

Speed of sound:
$c_{ph}=c_W$ + 30 m/s (1540 m/s at 20°C)
c_{ph}= speed of sound in phantom
c_W= speed of sound in water*

Attenuation:
Type 1: ~ 0.7 dB/cm/MHz**
Type 2: ~ 0.2 dB/cm/MHz**
Average 0.45 dB/cm/MHz

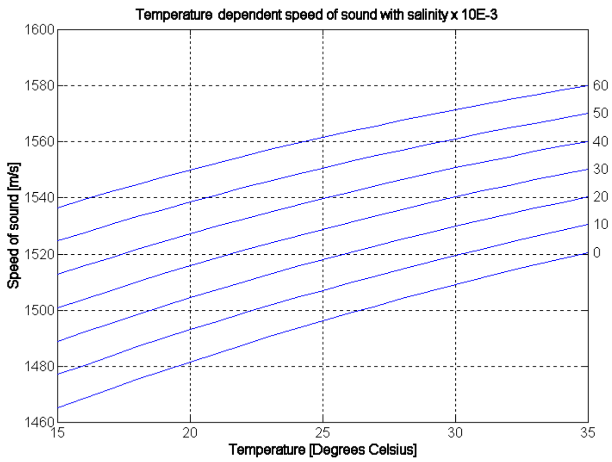
Targets: Type 2 foam.
Regular arrangement (see sketch)

Scan window: Polyurethane
11cm x 5.5cm (0.25 mm)

Description: 20cm x 12cm x 6.5cm

Warranty:
Foam : 10 Years
Scan window: 2 Years
(under the condition of proper use)

*c_W - diagram



**Temperature dependence of Attenuation

$$\alpha(f) = \alpha_o[1-\tau(T-T_o)^{\varepsilon}]\, f^{\gamma}\,[1+\kappa(T-T_o)]$$

α in dB/cm $T_o=20^oC$
T in degrees Celsius ($T>20^oC$), f in MHz

	type 1	type 2
α_o	0.6663	0.2070
τ	0.1804	0.0834
ε	0.4423	0.6990
γ	1.3063	1.2960
κ	0.0042	0.0076