

WEK-170 Magnetic Resonance Imaging Performance Test Phantom

1.Product Introduction and Structure

The WEK-170 Magnetic Resonance Imaging Performance Test Phantom is mainly used for nuclear magnetic resonance R&D testing,performance quality assessment,spatial resolution and imaging linearity testing,and low-contrast sensitivity testing.It measures magnetic field uniformity,signal-to-noise ratio(SNR),T1 and T2 values,spatial resolution(high resolution),density resolution(low contrast),geometric linearity,etc.

The WEK-170 Magnetic Resonance Imaging Performance Test Phantom meets the relevant requirements of standards such as YY/T0482-2022 and JJF(Beijing)30-2022,enabling the performance testing of MRI equipment.

The phantom consists of a 10cm cubic test insert and a cylindrical acrylic body.The cylinder has an outer diameter of 20 cm and an inner diameter of 19 cm,as shown in Figure A.1.

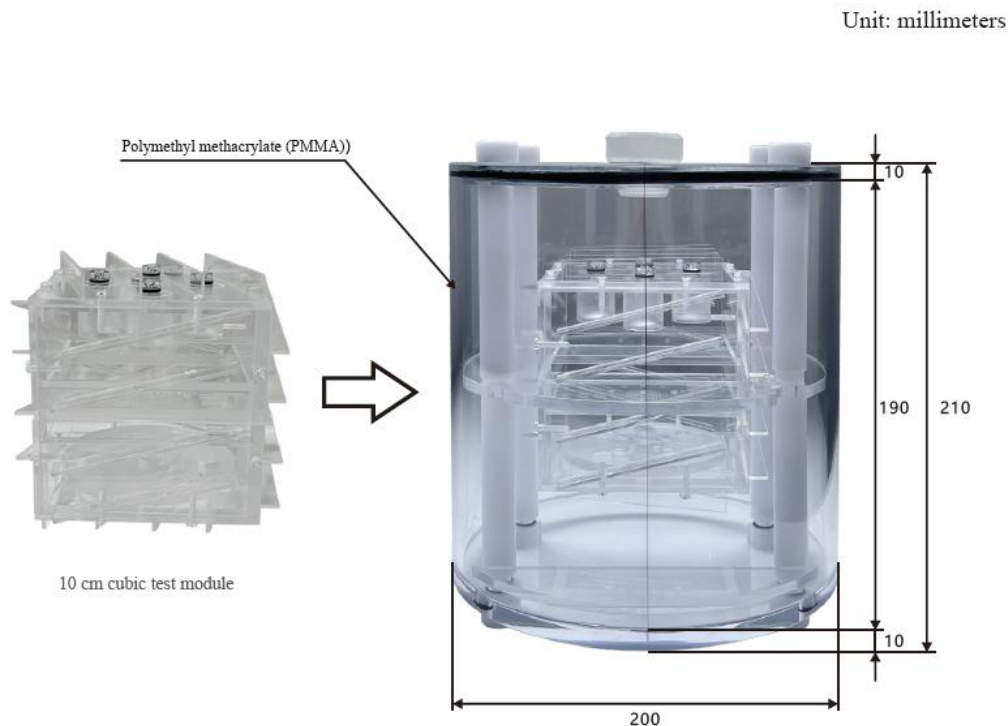


Figure A.1 Structure Diagram of SMR170 Magnetic Resonance Performance Testing Mold

2. Phantom Applications and Test Items

Applications of the WEK-170 Magnetic Resonance Imaging Performance Test Phantom in MRI scanners:

1. The phantom is used for comprehensive precision performance evaluation and daily quality checks of MRI scanners.
2. The acrylic cylindrical and spherical phantoms are filled with a copper sulfate solution internally.
3. Test parameters include:spatial resolution(high resolution),density resolution(low contrast),SNR measurement,T1 and T2 values,geometric linearity,etc.

Table A.1:Phantom Test Items

spatial uniformity	Scan slice thickness/slice spacing,verification of patient collimation positioning system
spatial resolution	11 lp/cm(0.45mm resolution),geometric distortion rate(spatial linearity),signal-to-noise ratio(SNR)
Low contrast sensitivity	Measurement of relaxation time values of T1 and T2,assessment of three-dimensional pixel size,sample testing



3. Phantom Filling Solution

1 liter of distilled water+1.955g copper(II)sulfate pentahydrate+3.6g sodium chloride.This complies with the technical requirements recommended by the American Association of Physicists in Medicine(AAPM)Report No.28,1990,and enables the testing of axial,coronal,and sagittal plane imaging performance in MRI.

4. Phantom Configuration







The test cube plate can be assembled in a standard 2-D configuration.The dual-opposed slice thickness ramp allows the operator to quickly verify that the phantom's axis is properly aligned perpendicular to the imaging plane.Nylon screws secure the unit together,allowing you to change the test plate or cube side to a 3-D structure.The 3-D configuration allows for obtaining x,y,and z slice geometry measurements from a single data acquisition.

5. Phantom Testing Summary

The test cube and phantom housing contain features that allow comprehensive testing of key MRI scanner parameters where feasible.The main components and tests they support are listed below:

- Slice Thickness Ramp→Phantom Positioning→Scan Slice Width→Multi-slice Spacing and Adjacency→Patient Alignment(3D)→Table Increment Accuracy
- Sensitometry Vials→T1 Measurement→T2 Measurement
- High-Resolution Test Plate→High-Resolution Measurement(1 to 11 line pairs per cm)→Geometric Distortion
- Cube Support Disk→Geometric Distortion→Pixel(Matrix)Size Verification
- Housing→Spatial Uniformity→Signal-to-Noise Ratio(SNR)

Table A.2:Phantom Accessory Parameters

Name	PMMA Main Body(Tank)	Lid	Cube Test Insert	Positioning Pin	Positioning Screw	Water Filling Port Screw
Image						
Diameter	200mm	200mm	100mm	20mm	20mm	34.5mm
Height	210mm	210mm	100mm	190mm	30mm	28mm
Quantity	1	1	1	4	8	2