

## Magnetic Resonance Imaging (MRI) – Acceptance Testing & Questionnaire

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Acceptance Testing will be performed by a medical physicist before the scanner is used to scan patients. The goal of the acceptance testing is to ensure that the scanner meets or exceeds the manufacturer’s specifications as is required by the CAR Standards for Magnetic Resonance Imaging. The references at the end of this section provide guidelines for the acceptance tests. However, actual tests may deviate from the guidelines due to the capabilities and limitations of the scanner and phantoms.

REQUIREMENTS	COMPLY YES/NO	DESCRIPTION
<b><i>1.0 Acceptance Testing</i></b>		
1.1 At a minimum, the scanner shall meet the performance levels specified in the ACR MRI Quality Control Manual.		
1.2 The medical physicist will be present during the installation of the scanner and during the initial testing by the manufacturer.		
1.3 The results of the homogeneity measurements shall be provided to the physicist.		
1.4 The physicist shall have access to the same diagnostic and testing software that the installation service personnel do.		
1.5 The physicist shall have access to the same diagnostic and testing phantoms that the installation service personnel do.		
<b><i>2.0 The manufacturer shall specify the following criteria for all applicable coil elements.</i></b> It is understood that data may not be available for some coils. However, uniformity and SNR specifications are required for the body, head and knee coils.		

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For the following, please specify the parameters used, ie. sequence type, voxel size, bandwidth and tip angle:		
Image Uniformity		
Image SNR		
High-Contrast Resolution		
<b>3.0 The manufacturer shall specify the following criteria:</b> It is understood that some specifications may not be available or applicable. Please specify the parameters used, ie. sequence type, voxel size, bandwidth and tip angle.		
Accuracy of slice thickness		
Geometric distortion within 10 cm of isocentre		
Geometric distortion at edge of maximum field-of-view		
Interslice RF interference		
Accuracy of slice separation		
Tip angle accuracy		
Linearity of RF pulse duration (tip angle versus pulse duration)		
Linearity of pulse amplitude (tip angle versus pulse amplitude)		
Accuracy of slice locations & alignment lights		
Locations of fringe fields, ie. Gauss 5 line		
Accuracy and precision of T1 and T2		

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measurements		
Spectral accuracy of single voxel spectroscopy, if applicable		
Spectral accuracy of CSI, if applicable		
Level of image ghosting		
Low contrast object detectability (usually specific to a particular phantom design and may not be possible)		
<b><i>4.0 Tests performed by the medical physicists: It is understood that some tests may not be possible due to limitations of the scanner or phantoms.</i></b>		
Image uniformity		
Image SNR		
High-contrast resolution		
Slice profile & thickness		
Geometric distortion		
Mapping of fringe fields, e.g. 5 Gauss line		
Linearity of RF pulse duration (tip angle versus pulse duration)		
Linearity of pulse amplitude (tip angle versus pulse amplitude)		
Accuracy of slice locations & alignment lights		
Accuracy of slice separation		
Accuracy and precision of T1 and T2 measurements		
Evaluation of image artefacts including ghosting		

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Spectral accuracy or calibration of single voxel spectroscopy		
Spectral accuracy or calibration of CSI, if applicable		
Interslice RF interference		
Low contrast object detectability		
Tip angle accuracy		
Short-term temporal stability		

### References:

AMP Report No. 28. Quality assurance methods and phantoms for magnetic resonance imaging: Report of AAPM nuclear magnetic resonance Task Group No. 1. Med. Phys. 1990, 17:287-295.

AAPM Report No. 34. Acceptance testing of magnetic resonance imaging systems. Med. Phys. 1992 19:217-229.

ACR Magnetic Resonance Imaging (MRI) Quality Control Manual. Copyright 2001, American College of Radiology.

CAR Standards for Magnetic Resonance Imaging. Copyright 1999, Canadian Association of Radiologists.

Firbank M.J., Harrison R.M, Williams E.D. and Coulthard A. 'Quality Assurance for MRI: practical experience'. British Journal of Radiology, 73 (2000) 376-383.

IPEM Report No. 80, Quality Control in Magnetic Resonance Imaging 1998.