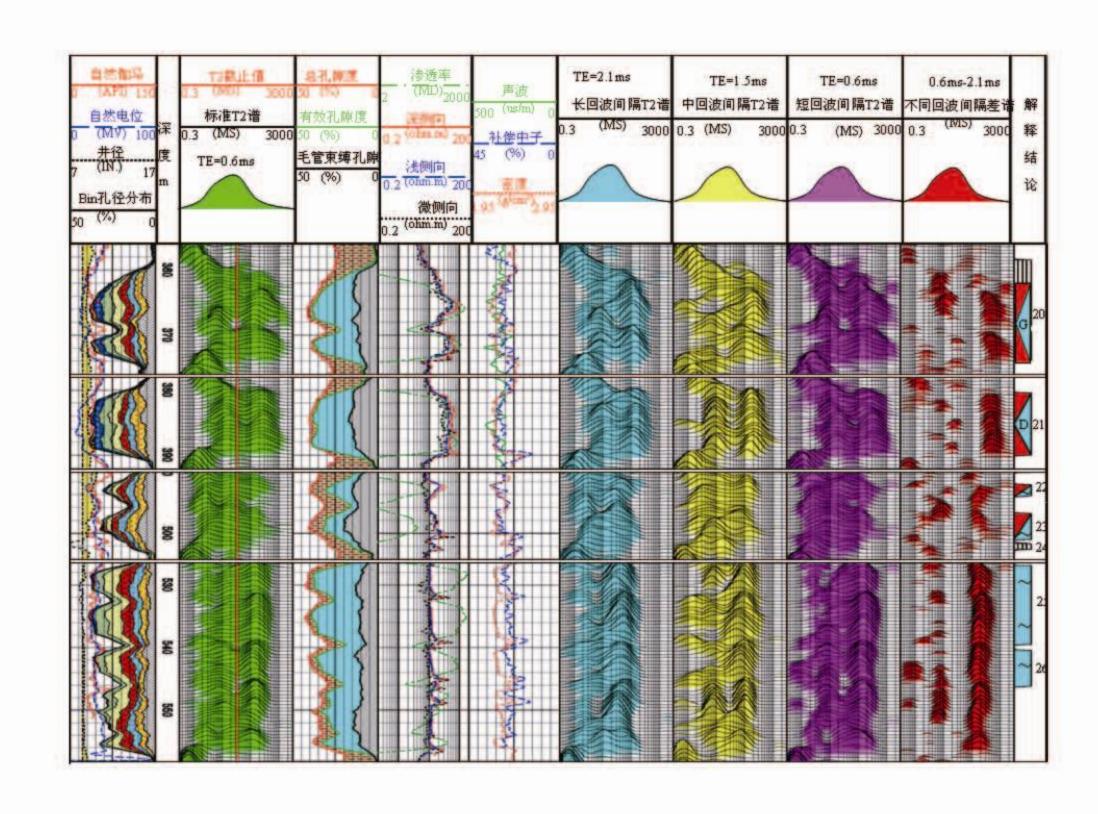


Nuclear Magnetic Resonance Tool (NMR-M)

The NMR-M tool measures hydrogen for porosity and relaxation rates of protons. This tool is primarily a digital device. NMR experiments are a measurement of time required for protons to either align with an external magnetic field or for processing protons to de-phase, or relax (T2 measurement).

Specifications

Maximum Temperature	350°F (175°C) for 2 hrs
Maximum Pressure	20,000 psi
Logging Speed:	
Standard T2, hydrocarbon typing:	logging: > 6 fpm
	target: 20fpm in low loss environment.
Total porosity:	
	logging: > 3fpm
	BVI logging: >30 fpm
	target: 60 fpm in low loss environment.
	Stationary Measurements possible
Tool Bandwidth:	
1200 echoes per second	22 Kbit/sec
Depth of investigation beyond borehole w	rall (depends on frequency)
	2.6 – 4.5 in
Investigation shell thickness:	0.06 in. (1.3 mm.)
Investigation shell arc length	120 deg.
Static Field Gradient	10 – 24 gauss/cm
Measurement range:	
Porosity	0 – 100 p.u
Per Echo noise level (rms). Rm>0.2 ohm-m	4 p.u.
Maximum Pulse rate	1200 echoes per sec.
Minimum TE	0.6 msec
	target < 0.4 msec
Measurement accuracy:	1 p.u.
Antenna aperture	24 in.
Wireline requirements	7 conductor
Operating power	AC Power (180VAC) <150mA
	DC Motor Power (-600VDC) < 1.2A



Make-up length:<17 ft.Shipping length:<18 ft.After disassembly at lab joint10 ft.Instrument weight:500lbs (227 kg.)Instrument Diameter5.0 in.Minimum Hole Diameter6.0 in.Maximum Hole Diameter14.0 in.Ring diameter1 inch below bit sizeThis means that if external equipment is required such as stand-offs, decentralizers, or external shields, it will close down to a diameter less than the ring size.Operating positionDecentralizedHole deviationVertical to horizontalMinimum Dogleg Radius (no tool bending)6" hole337 ft (17 deg/100 ft.)8" hole112 ft (51 deg/100 ft.)12.25" hole47 ft (120 deg/100 ft.)4" hole37 ft (153 deg/100 ft.)Minimum Dogleg Radius (bending, with safety factor 2)(33 deg/100 ft.)8" hole173 ft (33 deg/100 ft.)8" hole85 ft (67 deg/100 ft.)12.25" hole42 ft (136 deg/100 ft.)4" hole33 ft (169 deg/100 ft.)Tensile strength (safety factor 2)35,000 lb.Compressive Strength (with safety factor 2)unsupported48,000 lbs.48,000 lbs.8" hole16,000 lbs.10 lbs.4,000 ft-lbf8 ending strength of mandrel (safety factor 2)4,000ft-lbf		
After disassembly at lab joint 10 ft. Instrument weight: 500lbs (227 kg.) Instrument Diameter 5.0 in. Minimum Hole Diameter 14.0 in. Ring diameter 1 inch below bit size This means that if external equipment is required such as stand-offs, decentralizers, or external shields, it will close down to a diameter less than the ring size. Operating position Decentralized Hole deviation Vertical to horizontal Minimum Dogleg Radius (no tool bending) 6" hole 337 ft (17 deg/100 ft.) 8" hole 112 ft (51 deg/100 ft.) 12.25" hole 47 ft (120 deg/100 ft.) Minimum Dogleg Radius (bending, with safety factor 2) 6" hole 85 ft (67 deg/100 ft.) 8" hole 173 ft (33 deg/100 ft.) 12.25" hole 42 ft (136 deg/100 ft.) 12.25" hole 42 ft (136 deg/100 ft.) 14" hole 33 ft (169 deg/100 ft.) Tensile strength (safety factor 2) 35,000 lb. Compressive Strength (with safety factor 2) unsupported 4300 lbs. 6" hole 48,000 lbs. 8" hole 16,000 lbs. 14" hole 5300 lbs.	Make-up length:	<17 ft.
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unsupported 4300 lbs. 6" hole 48,000 lbs. 8" hole 16,000 lbs. 12.25" hole 6700 lbs. 14" hole 5300 lbs.	Tensile strength (safety factor 2)	35,000 lb.
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12.25" hole 6700 lbs. 5300 lbs.	6" hole	48,000 lbs.
14" hole 5300 lbs.	8" hole	16,000 lbs.
THE STATE OF THE S	12.25" hole	6700 lbs.
Bending strength of mandrel (safety factor 2) 4,000ft-lbf	14" hole	5300 lbs.
	Bending strength of mandrel (safety fa	actor 2) 4,000ft-lbf