

## Compact™ Spectral Gamma Ray Tools

Provides spectral gamma ray service in vertical, high-angle, small-diameter, and horizontal wellbores

### Applications

- Identifying clay-mineral composition, including heavy minerals
- Identifying kerogen and total organic carbon
- Differentiating between radioactive pay zones and shale
- Identifying fractured zones that contain high uranium concentrations
- Indicating formation permeability
- Correlating well-to-well detail
- Delineating the reservoir

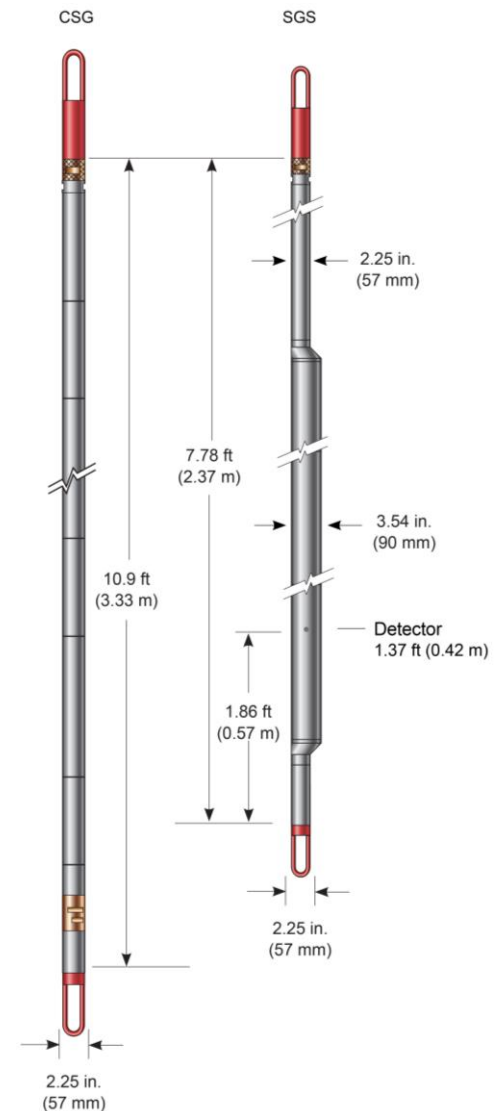
### Features and Benefits

- Efficient scintillation detectors in both the conventional spectral gamma ray (SGS) and Compact spectral gamma ray (CSG) tools provide detailed spectral analysis.
- The SGS tool uses a conventional, large-diameter, high-resolution detector to maintain statistical accuracy.
- The CSG tool uses a multi-detector composite measurement to maintain statistical accuracy.
- The CSG has been ruggedized with patented shock protection.
- Multiple CSG tools can be deployed in a single run.
- Both tools provide fully characterized, high-resolution potassium (K), uranium (U), and thorium (Th) measurements.
- Both tools facilitate wireline and pipe conveyance in wellbores that large-OD spectral tools cannot log.

### Tool Description

Weatherford spectral gamma ray tools—the Compact spectral gamma ray (CSG) tool and the conventional spectral gamma ray (SGS) tool—measure total natural gamma radiation and K, U, and Th quantities. The total gamma ray logs produced by the tools can be used to determine stratigraphic location, for correlation, and in the calculation of porosity and any quantity that requires clay volume. The spectral component adds the ability to distinguish hot sands from shale, identify organic carbon, and differentiates clay types—an important factor in the assessment of permeability.

Deployed in wireline or memory mode, the 2.25-in. CSG tool can log wells in which conventional wireline tools are ineffective, including horizontal, high-angle, and small-diameter wellbores. The SGS tool can be deployed in applications that do not require special conveyance considerations.



The Compact spectral gamma ray (CSG) and the conventional spectral gamma ray (SGS) tools differ in design and mechanical specifications, yet provide the same level of spectral gamma ray detail.



# Compact™ Spectral Gamma Ray Tools

## Specifications

### Measurement

Tool	CSG	SGS
Data	Total gamma (K, U, Th)	
Logging speed	1,800 ft/hr (9 m/min)	
Measurement range	No practical limit	
Vertical resolution	12 in. (305 mm)	
Resolution	1% of measured value	
Accuracy	K ±0.4% Th ±3.2 ppm U ±2.3 ppm	
Borehole fluids	WBM (KCl included), OBM, air	

### Mechanical

Maximum outer diameter	2.25 in. (57 mm)	3.5 in. (90 mm)
Length	10.9 ft (3.33 m)	7.8 ft (2.37 m)
Weight (air)	92 lb (42 kg)	107 lb (48.5 kg)
Maximum temperature	320°F (160°C)	
Maximum pressure	15,000 psi (103 MPa)	
Maximum borehole diameter	18 in. (457 mm)	
Minimum borehole diameter	2.8 in. (70 mm)	4 in. (102 mm)

