

## WELL INTEGRITY: PIPE EVALUATION

# High-Resolution Vertilog (HRVRT) service

Evaluate pipe integrity with the fastest and most precise tool in the market

### Applications

- Identify internal versus external corrosion problems
- Locate holes, corrosion, depth of penetration, and other defects
- Determine the effectiveness of cathodic protection and corrosion inhibitors
- Discriminate between actual corrosion and well completion equipment

### Features and benefits

- Multiaxial sensors with next-generation multiaxis data technology
  - Offer improved defect descriptions with greater accuracy and reliability
  - Allow increased circumferential and axial resolution
- Dynamic range of applications in a variety of downhole conditions
  - Offers greater flexibility in logging below casing
  - Enables negotiation around casing patches and other hardware
  - Eliminates unnecessary remediation work and reduces unplanned production outages
- Deployable on wireline or **TeleCoil™ intelligent coiled tubing**
  - Provides flexibility for reaching optimal performance

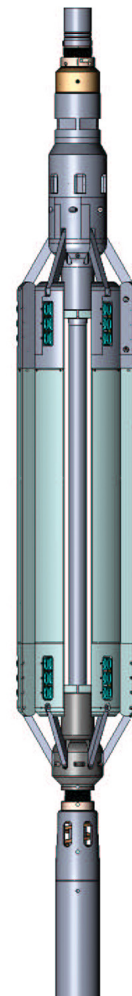
The **High-Resolution Vertilog™ (HRVRT™) service** provides the industry's most precise pipe integrity and corrosion evaluation, accurately characterizing casing and tubing strength. The service eliminates unnecessary remediation work and reduces unplanned production outages.

This service also provides flexible and efficient data acquisition, reducing operating time while improving data accuracy and operational safety. In conventional magnetic flux-leakage (MFL) tools, the flux leakage sensors are coils; however, in the Sondex high-resolution tool, the coil is replaced by multiple "hall effect" sensors. The HRVRT service uses MFL measurements to identify and quantify internal and external corrosion defects.

The overlapping arrays of the multiaxial sensors, flux-leakage sensors, and discriminator sensors offer full circumferential inspection of the tubing or casing string. This process differentiates between metal-loss (corrosion) and metal-gain (hardware) features, and distinguishes between general corrosion and isolated pitting. The service provides tubular burst-and-collapse strengths based on customer-defined criteria, facilitating consistent and rapid evaluation of the well's integrity.

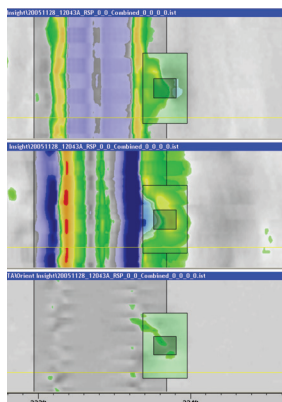
The HRVRT service provides a quantifiable defect description with an increased accuracy for length, width, and depth determination. This data is accurate for input into burst pressure calculations.

The HRVRT data acquisition is independent of logging speed. This allows it to better characterize defects in the well (especially near the wellhead), eliminate unnecessary remediation work, and reduce unplanned production outages.

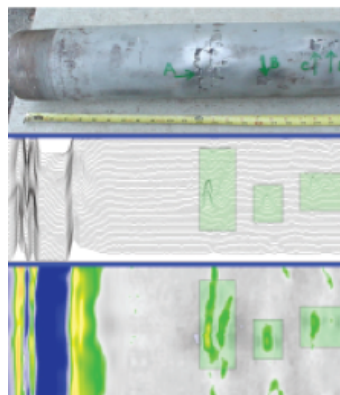


## High-Resolution Vertilog (HRVRT) service specifications

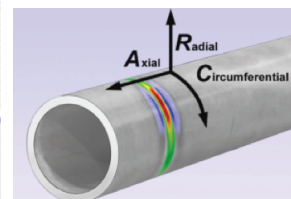
Tool series		4993	4994	4995	4997
Casing applications (in.)		3½	4½	5, 5½	7, 7⅝, 8⅝, 9⅝
Dynamic range	Maximum	3.3 in. (8.38 cm)	5.3 in. (13.46 cm)	5.3 in. (13.46 cm)	9.425 in. (23.99 cm)
	Minimum	2.7 in. (6.86 cm)	3.63 in. (9.22 cm)	4.0 in. (10.16 cm)	5.5 in. (13.97 cm)
Casing weight	Maximum	9.3 lb/ft (1.28 kg/m)	17 lb/ft (2.52 kg/m)	32 lb/ft (4.4 kg/m)	54 lb/ft (7.46 kg/m)
	Minimum	9.2 lb/ft (1.27 kg/m)	6.75 lb/ft (0.93 kg/m)	11.5 lb/ft (1.58 kg/m)	13 lb/ft (1.8 kg/m)
Tool length		15.5 ft (4.72 m)	15.5 ft (4.72 m)	15.5 ft (4.72 m)	19.75 ft (6.01 m)
Tool weight		300 lb (136.08 kg)	310 lb (140.9 kg)	340 lb (154.54 kg)	726 lb (329.54 kg)
Sensors	Axial	24 hall effect	48 hall effect	48 hall effect	96 hall effect
	Radial	24 hall effect	48 hall effect	48 hall effect	96 hall effect
	Circumferential	24 hall effect	48 hall effect	48 hall effect	96 hall effect
	Discriminator	N/A (MIT)	48 hall effect	48 hall effect	96 hall effect
Logging speed		200 ft/min (61 m/min)	180 ft/min (54.8 m/min)	180 ft/min (54.8 m/min)	160 ft/min (48.8 m/min)
Maximum pressure		15,000 psi/103.4 Mpa			
Maximum temperature		350°F/175°C			



The pipe and cross-sectional measurements of the defect and its analysis



Excellent agreement in the comparison of the HRVRT instrument measurements, analysis, and pipe



Multidirectional measurements for accuracy