

FLOW IDENTIFYING NOISE DETECTOR



The Flow Identifying Noise Detector (FIND) Technology is based on the acquisition of acoustic signal (noise) generated by the fluid passing through different types of media (formation channels/fractures, completion elements, cement bond, etc.) in frequency and amplitude domains.

FIND is a new generation spectral noise logging technology employing the split channels architecture of the tool.

The FIND tool is equipped with 3 highly sensitive hydrophones that detect all flow-related acoustic events in the wellbore and behind with pressure differential more than 0.1 PSI.

The split-channel architecture allows to record the high-resolution noise data within 4 independent channels with different frequency ranges and variable levels of amplification to signal, hence better accuracy of noise response. Recording the acoustic signal from each noise domain (low, mid, high and extra high) separately allows the precise radial localization of leak points and flow intervals in A/B/C annuluses as well as behind the casing.

The technology avoids the post-processing of the full noise spectrum, but uses split-channel architecture to enhance deliverables and minimizes human (interpreter) errors.

Applications:

- Well integrity evaluation (tubing/casing leaks, completion elements leaks, etc.)
- Evaluation of production/injection-related processes inside the reservoir behind single/multiple barriers or in an open hole section of the well

Advantages:

- Split-channels architecture of the FIND allows to precisely capture the processes related to a particular zone of the well or reservoir in a situation when the same response (frequency/amplitude signatures) might be interpreted obliquely



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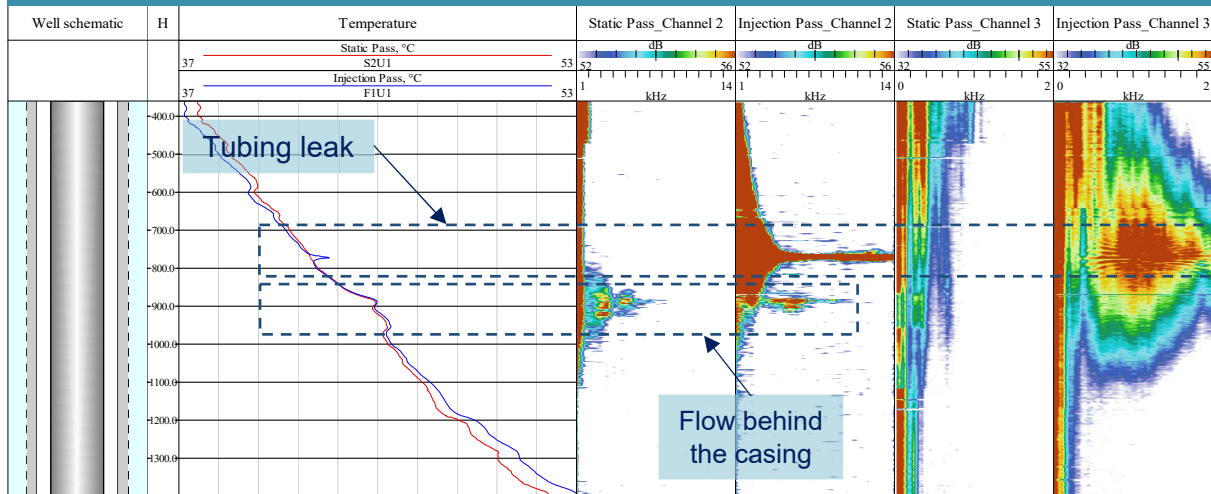
Tool Specifications	
Split-Channels architecture	Yes
Number of channels	4
Number of hydrophones	3
Dynamic range	112 dB
Frequency range	0.01-90.0 kHz
Number of spectral bands	512 x 4
Internal memory	4 Gb
Maximum operating pressure	14,500 PSI (100 MPa)
Maximum operating temperature	150°C (302°F)
Tool OD	1.65 in (42.0 mm)
Tool length	2.46 ft (0.75 m)
Tool weight	13.2 lbs (6 kg)
Connections	15/16 SR
Operational time	Over 100 hrs
H ₂ S resistance	6% standard (25% optional)
CO ₂ resistance	12%
Surface read-out / Memory	Both

The FIND records data with three highly sensitive hydrophones placed in oil-filled chambers. The recorded noise passes through an ultra-silent amplification stage, is converted into a digital bitstream, and then digitally processed. A part of the digital processing is the Fast Fourier transformation which builds the frequency response of acquired noise.

Deliverables:

- detailed acoustic profiles related to wellbore/reservoir processes
- wellbore/reservoir flow intervals localization
- leak detection
- flow behind the casing localization
- determination of different types of reservoir response (formation matrix flow, fractures, channels, cavities, and faults)

Cased hole logging. Leak detection. Flow behind the casing.



Open hole logging. Formation fracture localization and injection profile evaluation

