



Greenbank Terotech **Systems Division**

GA200[®] Series BSLD

Advanced Boiler Steam Leak Detection

Acoustic Identification and Location of Boiler Steam Tube Leaks



“Enhancing the performance of our customers plant & equipment”

www.greenbankgroup.com

GA200® & Series BSLD

Acoustic Steam Leak Detection System

Product Overview

Remote, Reliable, Early Detection and Location

The Greenbank GA200® series advanced acoustic steam leak detection system is for use on large electric utility boilers which operate using gas, oil, biomass, black or brown coal. The system accurately identifies and locates a boiler tube leak in its early stages against the noise of an operational boiler.

Steam leaks come from tubes which are sighted high in large steam generating combustion furnaces. These tubes contain fluid which is superheated to create steam to drive turbines that create our electricity. These tubes are subjected to extreme temperatures, temperature change, severe stresses, corrosion, flame impingement and embrittlement.

Tube failures appear in the form of splits, bending, bulging, cracking, erosion and rupture. Tube failures can often cause damage to adjacent plant and create significant safety issues if left undetected for any length of time.

The failure of boiler tubes is a common phenomenon in generating plants resulting in unscheduled shutdowns which provides the plant owners heavy revenue losses and the potential for disruption in electricity supplies.

The ability to provide remote, reliable, early identification of a tube leak and accurately identify its location amongst an array of tubes, is the USP of the GA200® advanced acoustic steam leak detection system.

Significant Benefits Using GA200®

- Early warning and positional indication of tube leaks
- Advanced sound detection with greater sensitivity
- Elimination of background noise improving accuracy
- Detects leaks remotely, improving safety and eliminating manual inspection
- Discriminates small and large leaks, both close to and far from sensors
- User interface option allows remote desktop user analysis of sounds, trends and data, which enables engineers to monitor tube leak development and compare sound data with prior events

Better By Design

- Absolute linear calibration at all times
- Detect leaks in banks of tubing in super-heater, re-heater, economizer and headers in boiler dead-space
- Airborne and structure-borne sensor options
- The GA® processor removes all of the background noise of a boiler for each sensor location
- Sensors are absolute and are factory calibrated. An increase of 10dB in signal without any soot-blower in service would prove a definite leak
- Modern microelectronics design encapsulating sensor and a digital log amplifier allows sensors to be rated to a temperature and water ingress resistance of IP68

Identify, Plan, Repair and Alleviate Risk

Experienced boiler engineers may hear leaks whilst being close to the boiler. But even when detected by the trained ear, leaks need to be big enough to be heard over the loud ambient noise of an operational boiler.

Manual verification of a leak may involve opening an inspection door close to the suspected noise. Should this be a leak, it will be ejecting steam at high pressure and elevated temperature. Ageing leaks can also lead to sudden catastrophic tube failure.

The GA200® system will detect a leak's high frequency sound amongst the background noise of an operational boiler days before the sound becomes loud enough to be heard by the human ear. This allows the engineer to identify a problem, plan its repair, and alleviate the chance any secondary damage or the risk to plant operatives. The boiler can have a repair undertaken quickly and efficiently at a planned shutdown having its location identified in advance.



Operating Philosophy

Advanced Leak Detection Monitoring

The GA200® series leak detection system is available in two formats.

The first format is a basic sensor-only system comprising of GA202® airborne and GA203® structure-borne sensors which connect directly to a customer's DCS. These sensors relay acoustic noise levels with some of the boilers background noise filtered and removed. With sufficient sensors the system will identify and provide an indication towards the proximity of a leak.

The second format is a GA202/3® multiple sensor system supported by a GA201® advanced processing system which provides rapid analysis of sound data from the raw output of each sensor. The system also enables independent user analysis via a remote engineering screen.

The GA201® processing system is unique as it:

- intelligently removes all of the boilers background noise
- provides perfect sound clarity of the leak
- provides an accurate indication of how far the sound has travelled
- provides clear indication and proximity of a tube leak

GA202® Advanced Airborne Sensors

The GA202® airborne sensor, fitted to the boiler externally via a stub pipe, is sensitive enough to detect small leaks at a significant distance from the source. The sensors require a 24 VDC supply and can output the decibel level as a 4-20 mA signal. Hence, the sensors can be utilised as a stand-alone system with an input straight into the plant DCS.

Each sensor has an IP68 rating, an extended 85°C temperature rating and provides a robust and absolute signal using a digital amplifier located inside the sensor that does not drift with age or temperature.

A 12mm min hole between the boiler webbing or an unused port is needed to allow sound to travel through a 20mm stub pipe to each sensor. The stub pipe also helps cool the air seen by the sensor and as such 125°C can be tolerated for short periods of time. Full-bore air purging is optional for locations with blockage potential to ensure a highly available and reliable measurement.

GA203® Advanced Structure-Borne Sensors

Each GA203® structure-borne sensor is fitted via a solid rod to 'fins' fitted between the tube wall for detecting leaks in lower parts of the boiler. The wall forms 'part' of the acoustic system and as such an increase in the relative dB is used to determine leaks. The GA203® sensors have been developed to detect leaks in the wall of tubing they are connected to and are well suited to areas prone to high slag formation or ash deposition.

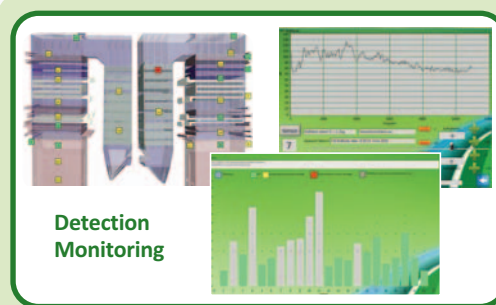
GA200® Advanced Processing System

The GA200® processing system undertakes rapid analysis of raw data and delivers bar charts, trends and frequency spectrums of current and historical data. This enables review of developing leaks and comparison of sounds with prior events, allowing the engineer to make informed and educated decisions.

The PLC system also enables remote listening via headset or speaker and incorporates an industrial touch screen which displays a boiler mimic with colour coded representation of each individual sensor dB level.

The GA200® system can be supplied in different formats:

- assembled on a back-plane for installation into a user's existing cabinet
- assembled in a stand-alone wall or floor-mounted processor cabinet
- with remote PC server and monitor or industrial Windows CE touch screen



Detection Monitoring



Advanced Processing System



Airborne Sensors



Structure-Borne Sensors

General Specification

GA202® Airborne Sensors

Power Supply:

18-24VDC at the sensor, 130mA

Output Signals:

4-20mA for 54-114 dB
 +/- 10mA, raw signal
 Raw AC signal +/-20mA
 LED indication on sensor at 93dB

Mechanical Connection:

Via 20-50mm (3/4"-2") pipe (supplied)

Electrical Connections:

Sensor: 5 core armoured cable up to 7m
 Air-purge: 3 core armoured cable up to 7m

Permissible Operating Temperature:

0-85°C continuous
 125°C periodically

Control System:

National Instruments PLC industrial controller

Features:

Digital amplifier, no drift with temp or age
 Absolute calibration
 Sound filters cut out background boiler noise

GA203® Structure-Borne Sensors

As GA202 except:

Mechanical Connection:

Connect to boiler membrane using rod



GA200® Series Processor System (Optional)

Standard Configuration:

Supplied as backplane complete with PLC

Output Signals:

Up to 2 relay alarms
 System running alarm
 Leak alarm
 LED indication on sensor at 93dB

Processor:

National Instruments real-time processor

Data Storage:

1TB hard drive

Options:

Processor cabinet floor or wall mounting

Remote access available:

- PC Server with monitor
- Industrial Windows CE touch screen

Dimensions:

Back-plane (standard) 1500H x 500W x 150D
 Cabinet (option) 2200H x 600W x 800D

Permissible Operating Temperature:

-20 to 55°C operating temperature

