



**Procon Engineering Ltd**

(Incorporating: Defiant - Negretti - Inflo - Lintvalve)

# **Boiler Tube Leak Detection**

## **for Utility, Chemical Recovery & HRSG Boilers**



**The benefits of early tube leak detection include:**

- **Increased operating profit by reducing financial penalties**
- **Avoiding unscheduled outages**
- **Reducing secondary damage**
- **Increased personal safety**

## Why is early detection essential?

**For Utilities** —To prevent expensive secondary damage and unscheduled outages in boilers, feedwater heaters, headers, steam pipes and valves.

**For Paper Mills** —To prevent smelt water explosive reactions in recovery boilers.

**For Process Plant** —To provide early warning of leaks in steam pipes, valves and heat exchanges.

## The real costs of undetected tube leaks

EPRI Report No RP1863 showed that electrical power generation plants have, on average, around 6% loss of plant availability due to boiler tube leaks.

The survey over USA & Europe found that boiler tube leaks were the single biggest cause of lost availability.

Detecting leaks by measuring make-up water or walking the boiler is very insensitive and usually gives information about the existence of a leak only when that leak is already large & creating serious secondary damage.

### Benefits of the early detection of tube leaks

- Increased operating profit
- Increased personal safety
- Increased availability and tube life
- Avoidance of unscheduled outages
- Reduction of outages, repair costs and secondary Damage
- Reduction of financial penalties and insurance costs

The Lintvalve leak detection system is designed to detect a steam leak the moment it begins, allowing time for a planned schedule to shut down the boiler at an optimum time, such as the weekend. Thus resulting in substantial reduction of repair times and costs with a consequent increase in availability and profits.

The early detection of a tube leak will give financial savings which will easily exceed the initial capital cost of the detection system even at the first event.

Lintvalve leak detection systems are built to the highest levels of quality by the company which invented the technology and introduced it to the world in 1974.

All systems and assemblies are designed and manufactured to ISO 9001 (EN29001) quality standards.

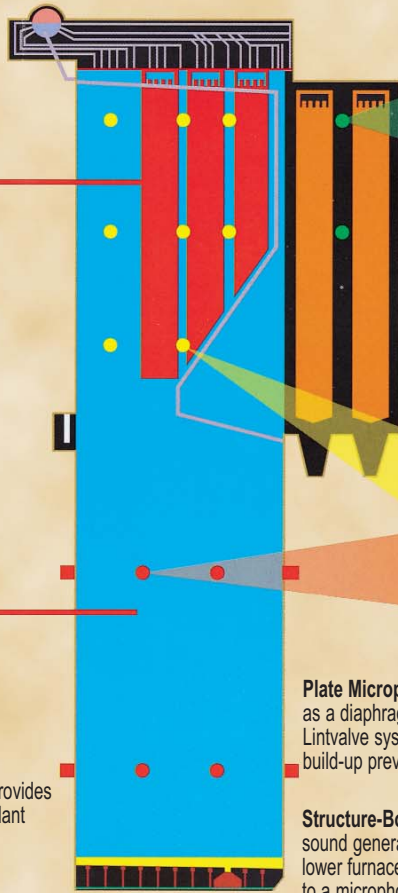
Lintvalve has over 25 years experience in detecting leaks.

The first commercial leak detection system in the world was installed on a boiler in 1974. With more than 250 installations in over 20 countries world-wide Lintvalve can proudly claim more experience and success than any other company in the field.

# TYPICAL SYSTEM OVERVIEW



Early warning of small tube leaks provides vital information that will increase plant safety and lead to increased boiler availability, reduced repair time and increased plant efficiency.

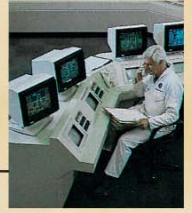


**Patented Airborne Sensors:** Lintvalve's acoustic microphone is shock and vibration resistant and 30 to 50 times more sensitive than piezo-electric microphones. This sensitivity enables the system to locate even very small leaks and gives you the time you need to plan a proper course of action for repair.

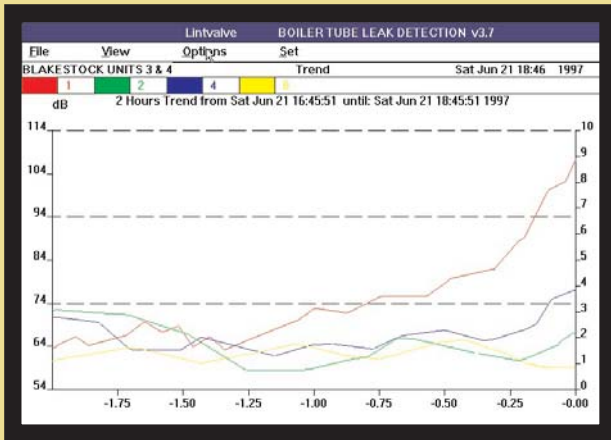


**Plate Microphone:** Piezo-electric based sensors, which use the boiler wall as a diaphragm to convert airborne audio signals into acoustic signals. The Lintvalve system uses plate microphones in areas where ash or salt cake build-up prevents the use of microphones which require an open pathway.

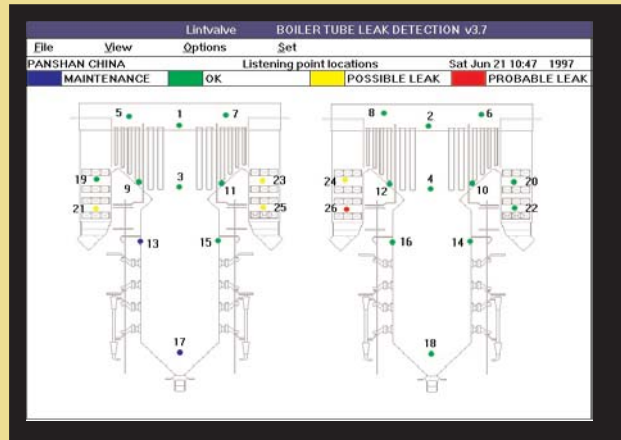
**Structure-Borne Sensors:** Piezo-electric based sensors measure ultrasonic sound generated by leaks in the boiler structure. Especially effective in lower furnace water wall area where hot slag readily blocks open pathways to a microphone or shatter sprays produce high levels of audio noise.



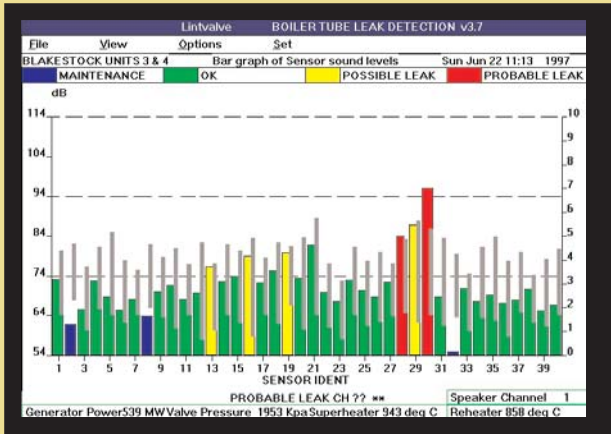
**The T96 System:** Designed so that boiler side equipment outputs a totally filtered signal that may connect directly to one of the following: 1. The plant's DCS, 2. A Lintvalve stand-alone industrial PC with display and remote monitoring option via modem, 3. Lintvalve computer linked to DCS.



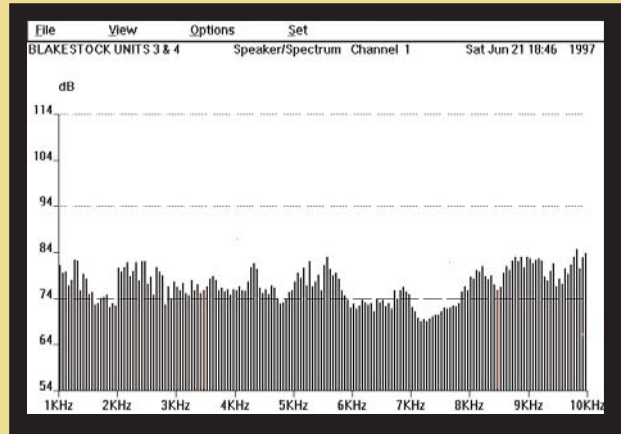
**Trend:** Up to 8 channels may be displayed over time periods of minutes, hours, days or weeks.



**Mimic:** All software displays carry the boiler name with date and time. The boiler diagram is custom configured to each specific installation.



**Bargraph:** The bars change colour to show the status of each signal. In most configurations sootblower or air purge sounds are not displayed.



**Spectrum:** The frequency spectrum of any individual signal may be selected. All software displays carry the boiler name with date and time.

## The system

The Lintvalve system utilises either patented airborne sensors (microphones) which measure sound pressure waves in the furnace gas or metal structure borne sensors which monitor for leaks as acoustic emissions which travel through the metal structure of the boiler or heat exchanger. The Lintvalve microphone has been shown to be 30-50 times more sensitive than competitive piezo-electric microphones. A very large logarithmic signal range of 60dB(1000:1) ensures that the optimum resolution is used at all signal levels and false or spurious alarms are never experienced. Lintvalve sensors contain sound or vibration generating elements so that operators can dynamically test individual sensor channels as well as the entire system, on-line, from the control room.

A unique portable sound level calibrator is provided to enable each microphone channel to be set, accurately and repeatedly, to this common reference which greatly enhances the ability of an operator to predict the position of a leak inside the boiler. Portable reference generators are supplied for the metal borne sensors. No other company is believed to supply such beneficial facilities.

The Lintvalve leak detection systems are designed so that they may be connected directly to one of the following:

1. The plant DCS computer.
2. A stand-alone Lintvalve industrial PC with signal processing data storage/retrieval, display, optional colour printer and optional remote interrogation.
3. Lintvalve computer digitally linked into the plant DCS.

Up to 96 signal channels, including 4-20mA plant signals, may be input to the computer allowing fullest flexibility and

permitting one computer to economically serve 4 or more boilers in one plant.

Standard display facilities include a **bar graph** for each channel, with three individual alarm set points.

A **boiler diagram** which shows the position of all sensors on the boiler. Both displays are colour coded to indicate each signal status.

A **trend** facility to retrieve data and show up to 8 signals and their variations with time on a time base from a few minutes to several months.

A frequency **spectrum** analysis of the unprocessed signal to enable operators to investigate the origin, characteristic and changes in signals with time or load.

**Remote interrogation** of the computer over the telephone network is available and Procon will, as an option, monitor the system in order to advise a customer during the initial period of operation of a new system.

## Other system features

Certain boilers, such as chemical recovery boilers, operate with continuous function sootblower systems.

**Sootblower interlock** enables the unwanted noise from the sootblowers to be excluded from the recorded data. Fly ash can periodically block the airborne waveguides and block the sounds from the boiler interior. Where this is a problem an optional automatic **air purge** system may be chosen.

A **loudspeaker** panel allows an operator to evaluate any abnormal sound which is detected. Abnormalities such as sootblower malfunction, fractured support brackets, access doors left open in error, damaged fans have all been identified by the system in this manner.

Other enhanced software features are added from time to time.

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Procon Engineering's policy is one of continuous product enhancement. We therefore reserve the right to incorporate technical modifications without prior notification

