

The inside environment



On-line production control systems for viewing the inside structure

TwinEye measuring systems for pre-insulated pipe production

Correct foam density and accurate internal positioning of pipes and wires ensures:

- **Product insulation**
- **Strength**
- **Intended function**
- **Lifetime**

- **Position of internal pipes of plastic or metal**
- **Position of alarm wires**
- **Internal foam density**

Application, single pipes



**Single pipe
& alarm wires**



**Single pipe
& PE casing**

Application, multiple pipes



Measuring system



TwinEye installed in a production line

Inside cabinet

- Guide-tube
- X-ray view system

Outside cabinet

- Control and data processing unit
- PC and monitor



TwinEye is available with:

- **Two X-ray sources for 2-dimensional imaging of internal structures.**
- **One X-ray source for 1-dimensional imaging of internal structures**

Features with 2 sources



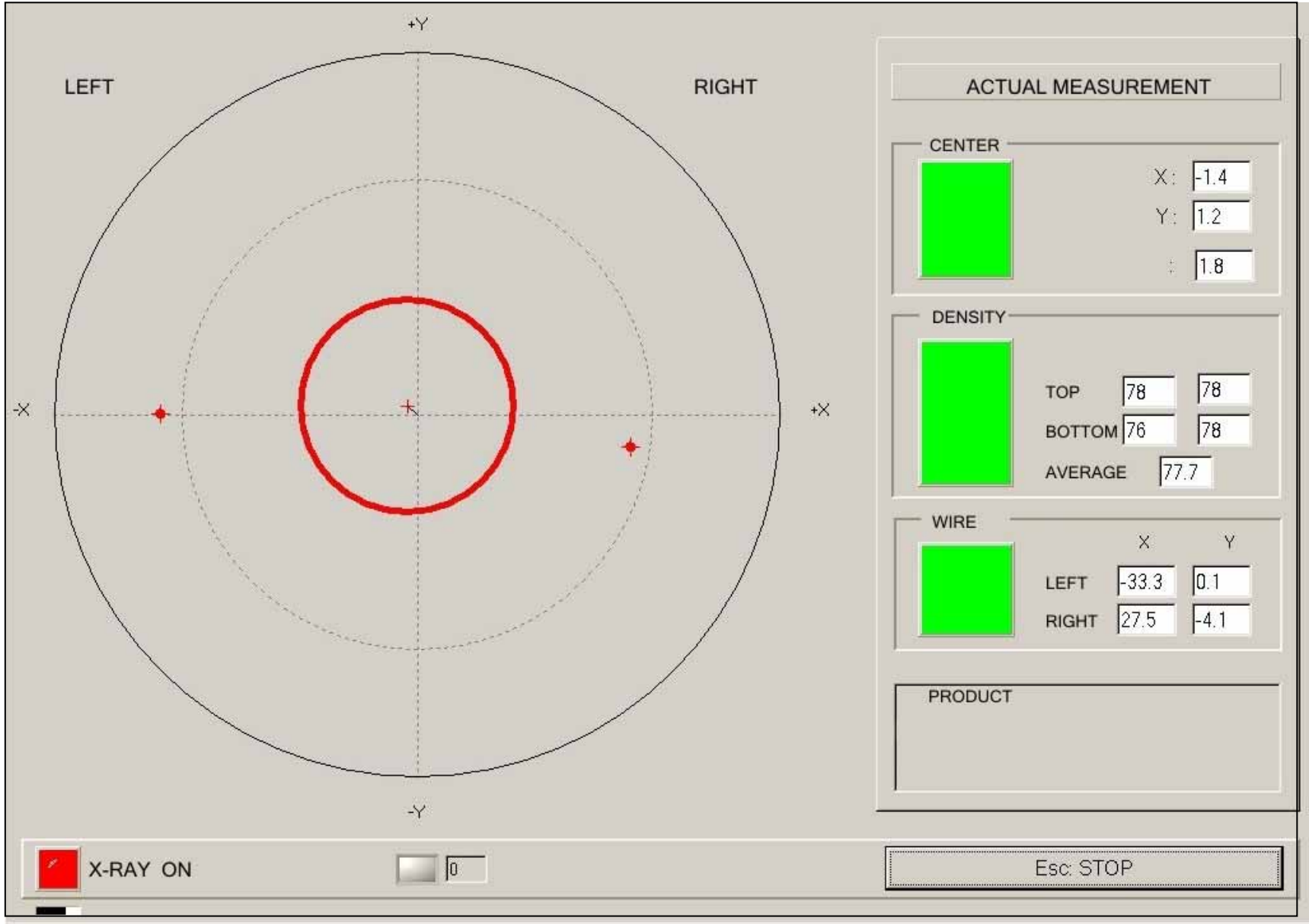
- **Product library**
- **Position of service pipes and wires**
- **Foam density in cross sections**
- **Identification of voids**
- **Identification of joints**
- **Alarm signal when out of limits**
- **Feed-back for production regulation**

Advantages with 2 sources



- **Uniform production quality**
- **Continuous quality control**
- **Feed-back signals for production control**
- **Materials saving**
- **Automatic quality documentation**
- **Reduced start-up time**
- **Customers get only quality products**

Screen picture, single pipe

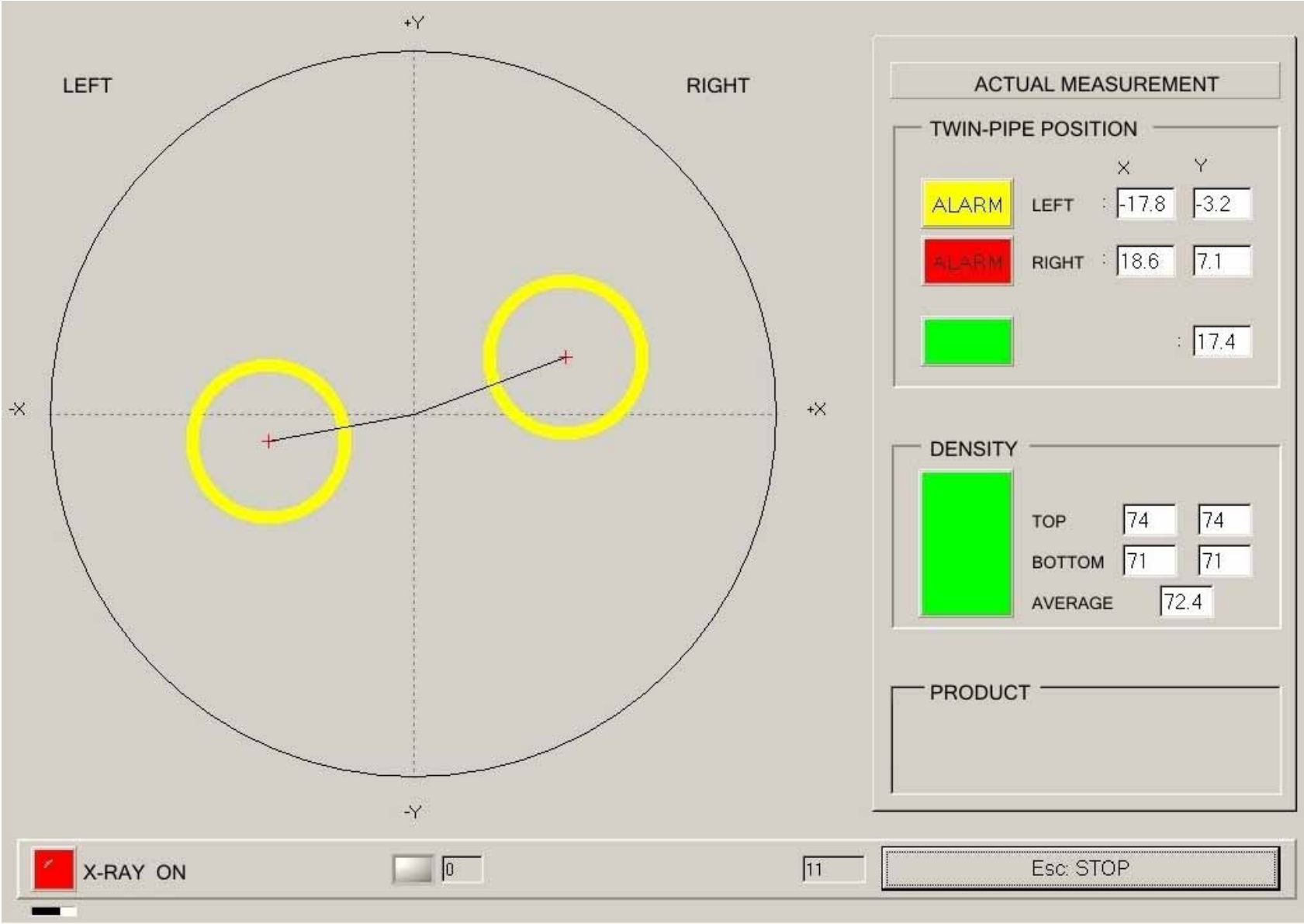


The interface displays a circular cross-section of a pipe with a red wire. The wire is positioned at the center of the pipe. The measurement data is as follows:

| ACTUAL MEASUREMENT | | |
|--------------------|-------|------|
| CENTER | | |
| X: | -1.4 | |
| Y: | 1.2 | |
| ρ: | 1.8 | |
| DENSITY | | |
| TOP | 78 | 78 |
| BOTTOM | 76 | 78 |
| AVERAGE | 77.7 | |
| WIRE | | |
| | X | Y |
| LEFT | -33.3 | 0.1 |
| RIGHT | 27.5 | -4.1 |
| PRODUCT | | |

At the bottom left, there is a red square labeled "X-RAY ON" and a small input field containing "0". At the bottom right, there is a button labeled "Esc: STOP".

Screen picture, twin pipe

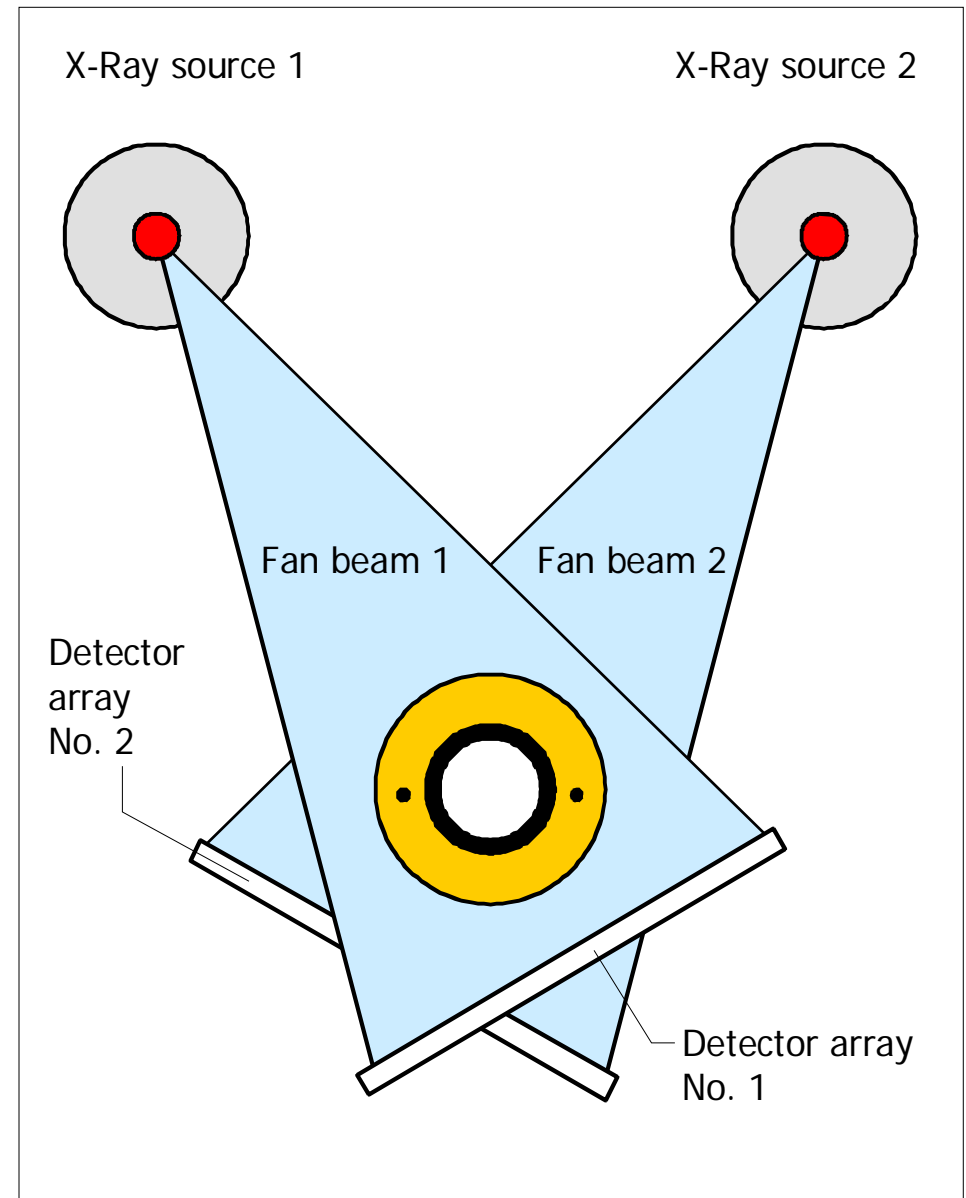


Twin source principle



The intensity of radiation transmitted through the pipe is detected by two sensor arrays.

The sensor signals are processed to map structures and show foam density inside the pipe casing.



The single source measuring system is designed for one-dimensional viewing through insulated pipe systems and multi-layer hoses

Single source provides



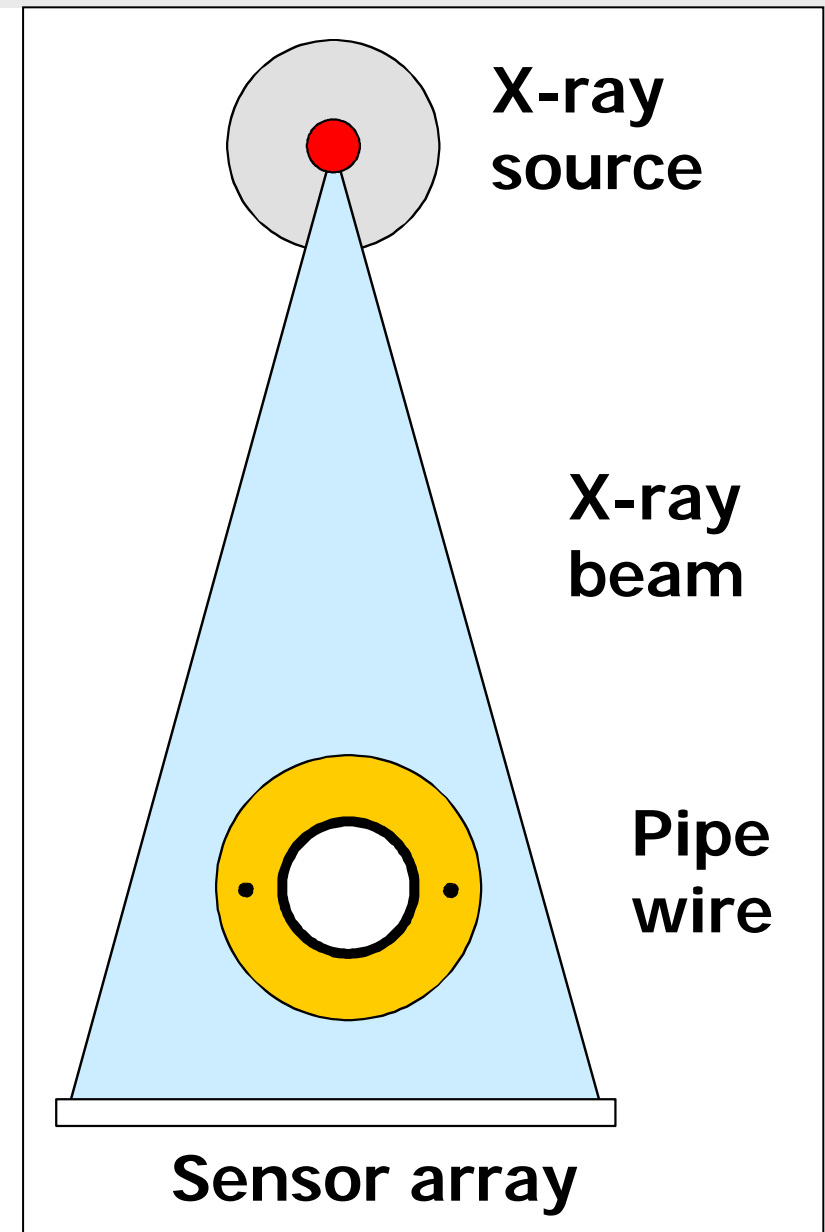
One-dimensional top view of concentricity in cross-sections and longitudinal images of:

- **Internal pipes and wires**
- **Layers of different density**

Single source principle

The intensity of transmitted radiation is detected by a high resolution sensor array.

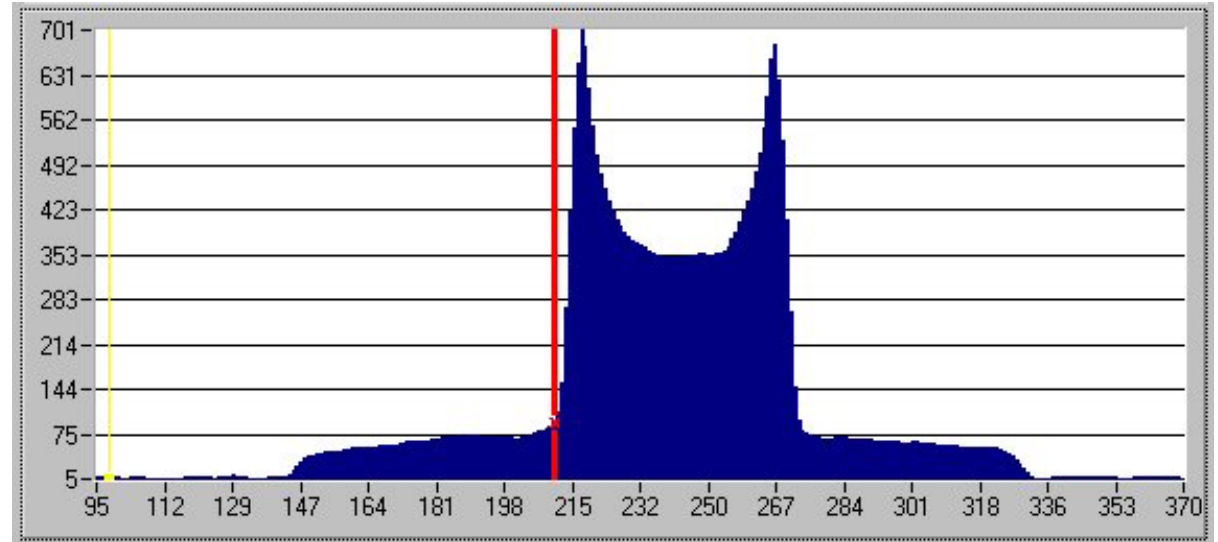
The sensor signals are processed to map the area weight integrated along the projection line from source to sensor point



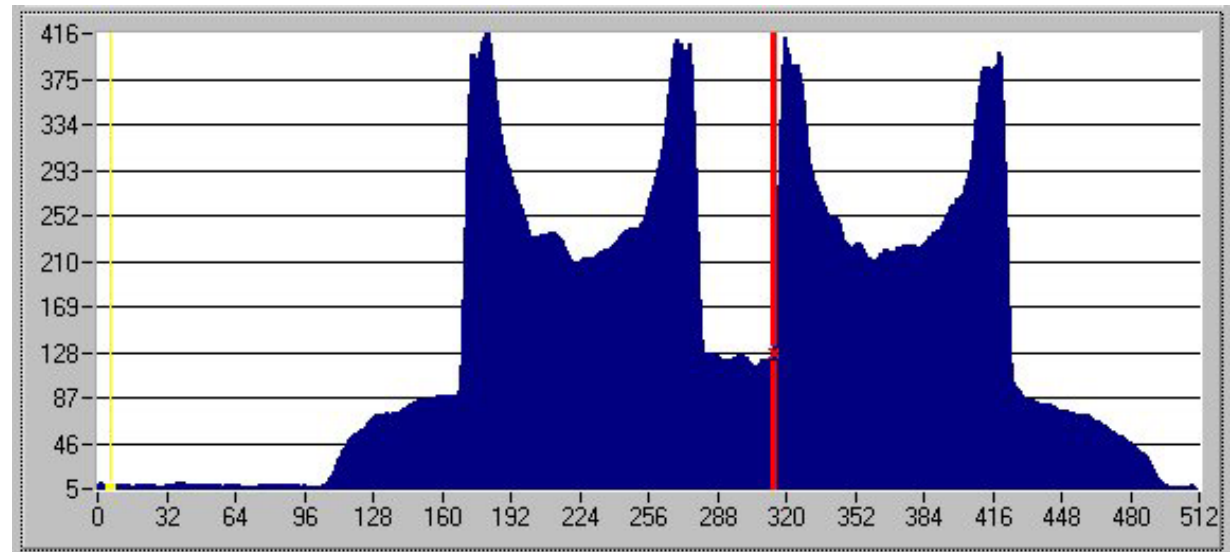
Top view of PE pipe



Cross section of single PE pipe



Cross section of two PE pipes

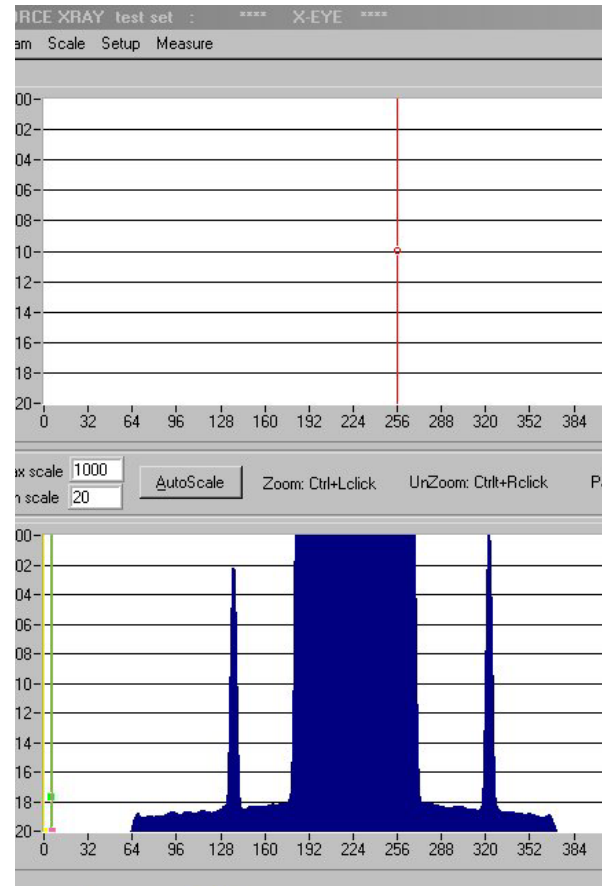


Top and longitudinal view

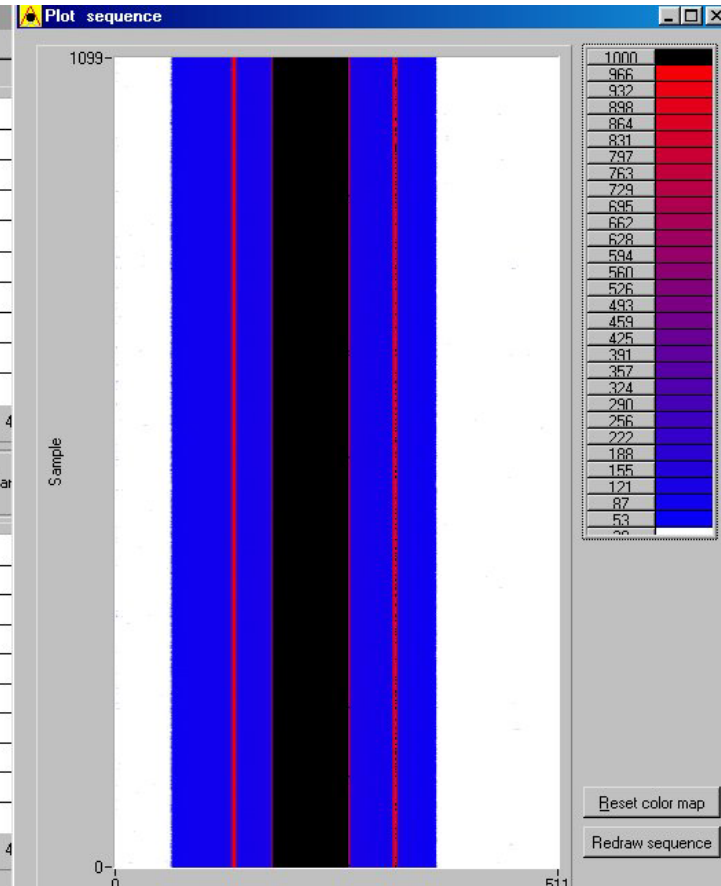


Insulated pipe with two alarm wires

The longitudinal image is processed on-line from 1099 running cross scans



Cross scan



Longitudinal image

Further Information



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