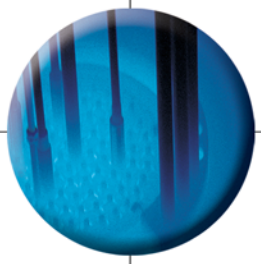


REES Thru-Wall Endoscope

Radiation Tolerant Thru-Wall/Roof Viewing System

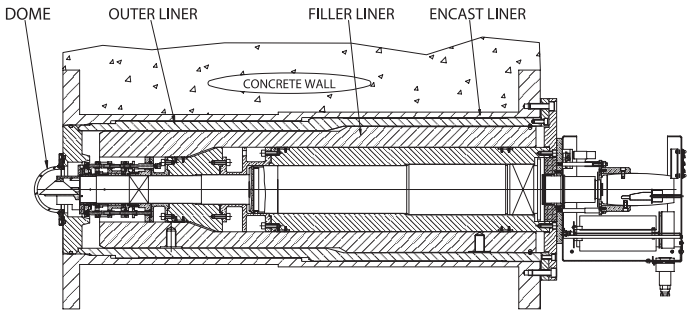
Features

- Standard and wide angle fields of view with 6:1 zoom range
- Shields against radiation shine path
- Modular endoscope system
- 750mm to 2000mm wall/roof thickness in 250mm steps
- Prism technology in viewing head for image correction
- Emulates pan and tilt camera thru-wall
- Remotely controlled via RS485 serial interface
- Full hemisphere viewing
- Non-browning viewing dome of hot side components
- Tested for 30-year operation
- Control electronics, drive motors and camera are easily accessible from cold side
- Designed for ALARA concepts

The IST **Through-Wall/Roof Camera** (Endoscope) Optical Inspection System is designed for viewing through the shielding wall of nuclear facilities such as a "hot cell". The endoscope relays a view of the inside of a cell to a CCD camera on the cold side of the wall.

REES *Thru-Wall Endoscope*

Specifications and Performance



The through-wall/roof camera allows pan/tilt viewing into a nuclear cell. Control of pan/tilt/zoom, auto iris and focus functions can be either via a system network or PC. A prism within a non-browning glass dome tilts and rotates to provide viewing within a hemisphere.

The image is relayed through a special endoscope that incorporates shielding to avoid the shine path that would otherwise result from a straight optical path. The camera module, zoom lens, prism/lens motor drives and video/control interface can be accessed from outside of the cell. The prism drive mechanism has been designed to be maintenance free and has been successfully life tested (simulation of 30-year use in a plant). The dome sealant has passed irradiation, leakage and pressure tests.

The through-wall/roof camera is installed within a liner system into an encast liner. The dome, mounted on the outer liner, provides a seal against contamination and remains in place should the through-wall camera need to be withdrawn.

The through-wall/roof camera can be installed into a 6.0" diameter encast liner or into a 10.5" encast liner with a filler liner (Figure 1).

The endoscope is modular in construction so that it can be configured to suit the wall/roof thickness and shielding characteristics. There are wide-angle zoom and narrow-angle zoom options.

For High Level Waste facilities, the typical wall thickness is 48". In this case, the camera provides equivalent shielding to the wall. When configured for a thickness of 30" or less, the effective shielding may be lower than that provided by the wall and remains compatible with less severe radiation levels.

Imaging Sensor	CCD (monochrome or color)			
Angles of View Options				
Standard:	Zoom out	Horizontal 21°	Vertical 15°	Diagonal 26°
	Zoom in	Horizontal 3.6°	Vertical 2.4°	Diagonal 4.8°
Wide Angle:	Zoom out	Horizontal 48°	Vertical 36°	Diagonal 58°
	Zoom in	Horizontal 10.5°	Vertical 8°	Diagonal 13°
Zoom Range	6:1 for standard and wide-angle versions			
Resolution				
Monochrome	Typically 580 TV lines with a minimum sensitivity of 100 lux at the 21° horizontal angle of view and 400 lux at the 3.5° horizontal angle of view			
Color	Typically 380 TV lines with a minimum sensitivity of 200 lux at the 21° horizontal angle of view and 800 lux at the 3.5° horizontal angle of view			
Aperture	Maximum aperture for wide angle zoom setting f/3 Maximum aperture for narrow angle zoom setting f/4.5			
Direction of view	Prisms provide full 360° rotate and ± 90° tilt of direction of view, allowing the system a hemisphere of view while maintaining an upright image			
Focus range				
Standard angle option	1000mm (40") to infinity			
Wide angle option	200mm (8") to infinity			
Iris range	f/3 to f/22			
Spectral Response	400nm to 700nm.			
Radiation Tolerance	1 x 10^8 rads at the dome			
Ambient Temperature	Operating: -10°C to +50°C (14°F to 122°F) Storage: -20°C to +60°C (-4°F to 140°F)			

Electrical/Control Interface

Power	90-264VAC, 50-60Hz
Video Output	1.0V p-p (NTSC or PAL)
Control	RS485 serial interface

Imaging and Sensing Technology Corporation

204 IST Center
Horseheads, NY 14845 USA
Tel: 607-562-4300
800-432-1478
Fax: 607-562-4392
E-mail: rees@istcorp.com

19501 144th Avenue NE
Suite F1100
Woodinville, WA 98072 USA
Tel: 425-881-0778
Fax: 425-869-0667
E-mail: rees@istcorp.com

12954 Stone Creek Dr.
Suite C
Pickerington, OH 43147 USA
Tel: 614-367-2050
Fax: 614-367-2464
E-mail: rees@istcorp.com

Station Road
Alton, Hampshire
GU34 2PZ, UK
Tel: 01420 541600
Fax: 01420 541700
E-mail: info@istcorp.co.uk

Kaiser-Konrad-Str 93a
D 53225 Bonn Deutschland
Tel: 0228 625088
Fax: 0228 626300
E-mail: info@istcorp.co.uk

1204