Inclinometer Casing

Inclinometer casing is a special purpose, grooved pipe used in inclinometer installations. It is typically installed in boreholes, but can also be embedded in fills, cast into concrete, or attached to structures. Inclinometer casing provides access for the inclinometer probe, allowing it to obtain subsurface measurements. Grooves inside the casing control the orientation of the probe and provide a surface from which repeatable tilt measurements can be obtained.

Choosing Inclinometer Casing

Although Slope Indicator casing is competitively priced, price should never be the deciding factor in choosing inclinometer casing. The cost of casing is quite small relative to the cost of mobilizing a drill rig, and very small relative to the cost of a failed installation. This page summarizes the most important factors to consider when choosing casing.

Casing Diameter
The useful life of the casing ends when ground movement pinches or shears the casing, preventing the probe from passing through. Larger diameter casing generally provides longer life.

85mm (3.34") Casing is suitable for landslides and long term monitoring. It is also appropriate for monitoring multiple shear zones or very narrow shear zones, and it is required for the horizontal Digitilt inclinometer probe.

70mm (2.75") Casing is suitable for construction projects. It can also be used for slope stability monitoring when only a moderate degree of deformation is anticipated.

48mm (1.9") Casing is suitable for applications where small deformations are distributed over broad zones. It is generally not installed in soils.

Casing Grooves
Measurement accuracy is directly influenced by the quality of casing grooves. Slope Indicator optimizes casing grooves for the wheels of the Digitilt inclinometer probe, providing a flat surface for the wheels and also the extra width needed when the probe must pass through cross-axis curvature. Groove spiral is also tightly controlled.

Casing Strength
In borehole installations, the annular space around the casing is usually backfilled with grout. The grouting process can generate pressure high enough to cause the casing to collapse. In deep installations, the pressure of grout must be controlled by stage grouting, but in other cases, the casing must be strong enough to withstand the normal pressure of grouting. Slope Indicator uses thick-walled pipe and carefully controls the depth of the grooves.

Sealable Couplings
If casing joints are not adequately sealed, grout can force its way into the casing and later prevent the probe from reaching its intended depth.

Slope Indicator offers several types of couplings and casings, all of which can be sealed easily and consistently. Our newest designs feature O-ring seals, and our older designs feature tight-fitting surfaces that are fused together with solvent cement.

Assembly
Inclinometer casing should be easy to assemble, even with an untrained crew. Slope Indicator’s QC casing, which snaps together, is the current leader in quick and easy assembly. Other types of casing are assembled with shear wires or with solvent cement.

Casing Materials
Slope Indicator uses only ABS plastic for its casing for several reasons. ABS plastic retains its shape and flexibility over a wider range of temperatures than PVC plastic. ABS plastic is much easier to handle and seal than fiberglass casing. Finally, ABS plastic is suitable for long term contact with all types of soils, grouts, and ground water, unlike aluminum casing, which is no longer recommended for any application.

Installation Information
Visit the technical support section at www.slopeindicator.com to find recommended grout mixes, ways to counter casing buoyancy, and notes on other installation issues.
QC CASING
QC (Quick Connect) casing features snap-together convenience and strong, flush joints.
Grooves: Grooves are machine broached for excellent control of width, chamfer, depth, straightness, and spiral.
Sealing: O-ring seals prevent entry of grout.
Coupling: Built-in couplings snap together to make a flush joint. Unique locking mechanism engages full inner circumference of casing, providing much stronger joints than other snap-type casings.
Assembly: Press casing sections together until joint snaps closed. The resulting joint is strong, flush, and grout-proof. Solvent cement, rivets, or tape are not required. O-ring lubricant is applied at factory. Extra O-rings and lubricant are supplied with each box of casing.

Best for: General use.

QC Casing 85mm · 3.34"
Casing OD: 85 mm, 3.34 inches.
Casing ID: 73 mm, 2.87 inches.
Collapse Rating: 12.4 bar, 180 psi.
Load Rating: 635 kg, 1400 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10’ section.

QC Casing 70mm · 2.75"
Casing OD: 70 mm, 2.75 inches.
Casing ID: 59 mm, 2.32 inches.
Collapse Rating: 16.5 bar, 240 psi.
Load Rating: 635 kg, 1400 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10’ section.

STANDARD CASING
Slope Indicator’s traditional inclinometer casing features high-strength, flush joints and is available in three diameters.
Grooves: Grooves are machine broached for excellent control of width, chamfer, depth, straightness, and spiral.
Sealing: Solvent cement and tape.
Coupling: Precision molded couplings have interference fit for high-strength bonding. Small diameter version has integral couplings.
Assembly: Casing and couplings are glued together with ABS solvent cement, riveted, and wrapped with tape.

Best for: General use. The extra-strong joints are helpful in very deep boreholes and oversize boreholes in which casing is not well supported.

Standard Casing 85mm · 3.34"
Coupling OD: 89 mm, 3.51 inches.
Casing OD: 85 mm, 3.34 inches.
Casing ID: 73 mm, 2.87 inches.
Collapse Rating: 10.6 bar, 155 psi.
Load Rating: 320 kg, 700 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10’ section.

Standard Casing 70mm · 2.75"
Coupling OD: 70 mm, 2.75 inches.
Casing OD: 70 mm, 2.75 inches.
Casing ID: 60 mm, 2.35 inches.
Collapse Rating: 15 bar, 220 psi.
Load Rating: 320 kg, 700 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10’ section.

Standard Casing 48mm · 1.9"
Coupling OD: 48 mm, 1.9 inches.
Casing OD: 48 mm, 1.9 inches.
Casing ID: 38 mm, 1.5 inches.
Collapse Rating: 24 bar, 350 psi.
Load Rating: 320 kg, 700 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10’ section.

EPIC CASING
EPIC casing is an economical casing that can be cut and coupled at any point along its length.
Grooves: Grooves are formed during extrusion and are less precise than broached grooves.
Sealing: Solvent cement, mastic, and tape.
Coupling: Oversize couplings make very strong joints.
Assembly: Casing and couplings are glued together with ABS solvent cement. The joint must then be sealed with mastic and tape.

Best for: General use. Some care must be taken to seal the coupling.

EPIC Casing 70mm · 2.75" Only
Coupling OD: 78 mm, 3.07 inches.
Casing OD: 70 mm, 2.75 inches.
Casing ID: 60 mm, 2.32 inches.
Collapse Rating: 15 bar, 220 psi.
Load Rating: 320 kg, 700 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.5º per 3m or 10’ section.
CPI CASING
CPI casing features quick assembly and disassembly and is available in 3 diameters.

Grooves: Grooves are machine broached for excellent control of width, chamfer, depth, straightness, and spiral.

Sealing: O-ring seals prevent entry of grout.

Coupling: Oversize couplings and shear wires make high strength joint.

Assembly: Apply grease to O-rings, press coupling onto casing, and insert shear wire.

Best for: Cold weather assembly or temporary installations that involve repeated disassembly.

CPI Casing 85mm · 3.34"
Coupling OD: 94 mm, 3.7 inches.
Casing OD: 85 mm, 3.34 inches.
Casing ID: 73 mm, 2.87 inches.
Collapse Rating: 11 bar, 155 psi.
Load Rating: 635 kg, 1400 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10' section.

CPI Casing 70mm · 2.75"
Coupling OD: 76 mm, 3 inches.
Casing OD: 70 mm, 2.75 inches.
Casing ID: 59 mm, 2.32 inches.
Collapse Rating: 15 bar, 220 psi.
Load Rating: 400 kg, 900 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10' section.

CPI Casing, 48mm · 1.9"
Coupling OD: 54 mm, 2.12 inches.
Casing OD: 48 mm, 1.9 inches.
Casing ID: 38 mm, 1.5 inches.
Collapse Rating: 24 bar, 350 psi.
Load Rating: 320 kg, 900 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10' section.

SHEAR-WIRE CASING
Shear-Wire casing features flush joints that can be assembled easily in cold weather.

Grooves: Grooves are machine broached for excellent control of width, chamfer, depth, straightness, and spiral.

Sealing: O-ring seals prevent entry of grout.

Coupling: Built-in couplings lock together with removable nylon shear wire to make flush joint.

Assembly: Press casing sections together, then insert shear wire. The result is a flush, grout-proof joint. Solvent cement, rivets, and tape are not required. O-ring lubricant is applied at the factory. Extra O-rings, lubricant, and shear wires are supplied with each box of casing.

Best for: Easy assembly in weather that is too cold for solvent cement or snap-together joints. Generally used in water-filled boreholes.

Shear Wire Casing 85mm · 3.34"
Casing OD: 85 mm, 3.34 inches.
Casing ID: 73 mm, 2.87 inches.
Collapse Rating: 12.4 bar, 180 psi.
Load Rating: 225 kg, 500 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10' section.

Shear Wire Casing 70mm · 2.75"
Casing OD: 70 mm, 2.75 inches.
Casing ID: 59 mm, 2.32 inches.
Collapse Rating: 16.5 bar, 240 psi.
Load Rating: 225 kg, 500 lb.
Temp rating: -29 to 88 ºC, -20 to 190 ºF.
Spiral: ≤ 0.33º per 3m or 10' section.

GROUT VALVES
Grout valves allow placement of grout backfill in boreholes that cannot accommodate an external grout pipe. The one-way valve is installed in the bottom section of casing. A grout pipe is lowered through the casing to mate with the grout valve and deliver the grout.

TELESCOPING SECTIONS
Optional telescoping sections accommodate 150 mm (6 inches) of compression or extension. Fully extended, each telescoping section adds 0.76 m (2.5 feet) of length to the casing.

CASING ANCHORS
In its fluid state, grout exerts an uplift force that can push even water-filled casing out of the borehole. Holding the casing down from the top has unfortunate side-effects: the casing goes into compression and snakes from side to side in the borehole. Thus casing curvature is present from the start, and slight variations in the positioning of the probe are more likely to produce reading errors.

The casing anchor, installed in place of the bottom cap, provides a convenient way to counter casing buoyancy and reduces casing curvature, since the casing self-centers in the borehole. The anchor has spring loaded arms that are activated when a pin is pulled. Anchors are available for 70 mm and 85 mm casing.
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