New

Biosirus

Snap-Pipes

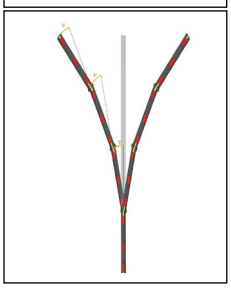
Cable Protection System

All-Terrain Single Solution (Surface, Below-Grade, Water)
Significantly Reduces Cost of Undergrounding
Recycled Automotive Plastics (GHG Friendly)

Fire-Resistance Coatings Available Upon Request

- **Application:**
  - **Industry:** Mining, Oil & Gas, Manufacturing, Defence
  - **Utilities/Renewable Energy:** Power Plants, Substations, Power Distribution, Wind, PV
  - **Transportation:** Rail/Metro (along tracks), Shipyards, Airports
  - **Construction Sites:** Temporary Power and Re-Use applications
  - **Public Security:** Safeguard, protection, visibility

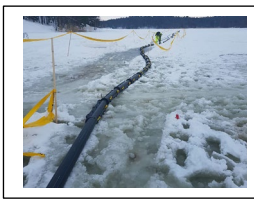
- **Features:**
  - Hinged split pipes snapped around cable; Three Models; Coloured tab-lock
  - Eliminates deep trenches, underground pipes, sand-beds, flagstone/brick cover
  - All terrain – Rock, Clay, Sand, Forest, Thickets, Snow, Permafrost
  - All application - Surface, Below-Grade, Water-Crossing, Lakes, Submarine
  - No heavy machinery; No power tools; Videos: Cable Protection System | Biosirus Inc.
  - Pays itself from construction savings; Presentation: Downloads (biosirus.com)



- **How Does It Work:**
  - Integrated locks and hinges secures the half shells
  - Secure flexible collar connection between pipes (7/15/22 degree flex in x-y-z planes)
  - Built-in mounts to attach weights (underwater) or secure to rock or lake-bed

- **Technical Data:**
  - **Pipe ID Sizes:** 50/100/110/140/145/150/200 mm (2.0/3.9/4.3/5.5/5.7/5.9/7.9 in)
  - **Max. Cable dia. (at 70%):** 35/70/77/98/101/105/140 mm (1.4/2.7/3.0/3.9/4.0/4.1/5.5 in)
  - **Length:** About 1m (3 feet); Flexible (7/15/22 degree) collar; For tight bends use 0.3m (1 ft.) pipes
  - **Material:** Recycled high-grade automotive plastic (PP-EPDM); UV and Oil Resistant
  - **Ambient Temperature:** -40 deg C to +55 deg C (-40 deg F to +135 deg F)
  - **Environment Benefits**: GHG Saving – about 2.8 tons of CO2-eqiv. per mile
  - **Mechanical Tests:** Compression (Class 800-1250) and Impact (Code N) tested to EN 61386-24
  - **Weight:** 1.7- 8 kg (3.8–18 lbs) depending on pipe diameter, pipe thickness, and model
- **Operation:**
  Self-contained one or two-person operation to "enclose/wrap" cable(s) as it is being slowly pulled or laid. Each pipe segment is light enough to be carried by an individual. No power tools or mechanical equipment needed. Material can be stored at site. *A much lower cost option than traditional methods.*







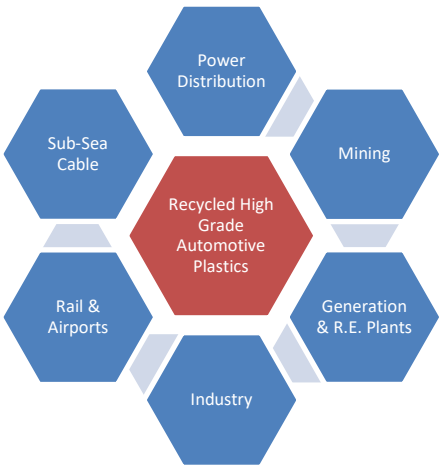
Tech Talk: *Power of Snap-Pipes*

Snap-Pipes are hinged, rigid, split-pipe cable protection system (about 1 m or 3 ft long) that interconnect with each other using a unique flexible collar. Each pipe segment collar allows for a coupling flexibility of 7/15/22 degrees depending on the model (in all x-y-z planes) to enable terrain matching and cable runs. For tight bends 0.3m (1 ft.) pipe is used.

Power cables in urban, semi-urban and rural areas are laid underground in duct banks or by direct burial methods. Off-late, horizontal drilling is used in dense urban areas (to avoid digging) with a pipe insertion (to prevent cave-ins) through which a cable is pulled. In semi-urban and rural areas, cables are direct buried in trenches, in a bed of sand (top & bottom of cable), with flagstone/brick protection covers on top and then backfilled with soil. The trenches are deep enough to ensure no mechanical damage. *All these methods are very mechanized, labour intensive, slow and expensive, relative to the cost of the cable itself.* Further, cable faults require re-exposing the "trench dig" and/or cable sections being pulled out to remediate. *All cable pulls (however careful) has the risk of "burns" due to friction with the duct/pipe material resulting in potential tears to PVC jackets. With Snap-Pipes there is no such possibilities as it is snapped around the cable.*

Climate Change is forcing many overhead power distribution lines to be replaced by underground cables. Such additional cable runs are globally estimated to be about 20,000 km/year. Clearly, the traditional methods of cable-laying pose both a time and cost challenge.

Snap-Pipes address these challenges by providing a physical protection to the cable, thus enabling them to be placed either at-grade (matching the terrain) or below-grade at much shallower depths or water crossing applications. It also eliminates the use of duct banks and sand/flagstone/brick covers in direct buried applications. There is a Snap-Pipe to fit every power, fiber-optic and control cable application. ***A new way to reduce the cost of undergrounding.***



Target Clientele

- Utilities
- Industry
- Renewable Energy
- Smart Infra & Cities
- Transportation

Applications

- Surface
- Shallow-buried
- Temporary Install
- Along rail tracks
- Water Crossings

Typical Applications

Power Distribution

Industry

Generation & R.E. Plants

Mines

And Savings Too:

Lower costs, greater ROI and a scalable speedier long-term solution. ***Other savings: No Vegetation Management; Easy fault-section pipe opening.***

Best Value Applications:

Parameters	Platinum Savings	Gold Savings	Silver Savings	Bronze Savings
Drilling & Trenching	*****	****		
Direct Burial	*****	****		
Rocky Soil	*****	****		
Accidental Contact Safety	*****	****		
Excavation Prone	*****	****	***	**
Water bodies- Entry/Exit	*****	****	***	**
Short-term use & Reuse	*****	****	***	
Typical Pay back (simple ROI)	1 Year	2 Years	3 Years	4 Years

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Call us for any details or a trial project

FAQ: *Power of Snap-Pipes*

Preamble:

There are two schools of societal thoughts related to most infrastructure assets:

a) **"Communities Heed Warnings":** There are many dangers in the community, but these are marked with visible warnings (above-ground gas pipes in residential/commercial/industrial common areas; O&G pipelines in rural areas; and overhead electrical infrastructure in crowded cities). *We live amongst complex dangers, but we heed. warnings.*

b) **"Protecting Electrical Assets":** Electrical standards maintain this view. Despite this, critical electrical infrastructure (overhead lines, pole-top DTs) is in the open and targets of vandalism. *Assets kept out of sight reduce public risk.* Underground cabling standards is one but incurs a huge cost. *Can this be achieved with newer alternative methods?*

Snap Pipes have been designed keeping utility requirements in view. They cater to both themes above - "Ground Level Distribution System" (GLDS) and shallow trench applications. Snap Pipes offer advantages as in (i) easy opening of few pipe sections at cable fault location; (ii) no "cable-pull" burns as with conduits; (iii) less construction effort than buried conduits or direct burial; (iv) surface load capability at shallower depths; (v) minimal inventory capable of handling all terrains; (vi) No heavy construction machinery; and (vi) land/water terrain hugging flexibility in x-y-z planes.

Question:

1. **Can Snap Pipes be used for all KV classes (LV, MV, HV) cables.**
   Snap Pipes offer physical protection to a cable and should not be relied for electrical insulation (albeit >100MΩ). Wherever it is safe to run a HV, MV, LV cables, these can be used. Code requirements to "safe limits" will still apply as with any other traditional methods.

2. **What do you mean by few inventories for all terrain applications.**
   Snap Pipes are held together as a "flexible chain" and they can follow terrain contours (land, shorelines, water depths, rocks, forest, hills). A single inventory family is all that is needed in 4" and 6" sizes for ALL cabling work.

3. **Explain "x-y-z" Flexible Collar**
   Each pipe has a collar that connects to another pipe. There is a designed flexibility in the connection between the pipes in all the three (x-y-z) planes (hence the terrain hugging capability). The Quicklock has flex of 22 degrees (x-y-z) while the Hardlock has a 15-degree flex (x-y-z) and the Panzar has 7-degree flex (x-y-z).

4. **Accommodating tight cable turns**
   Each cable has a minimum specified bending radius (5-10 times cable diameter). While the wider turns are accommodated by the standard pipes, the tighter turns are enabled by deploying shorter pipes (300mm or 12 in.).

5. **How do Snap Pipes enable huge cost reductions in cabling (faster-cheaper-better).**
   It is achieved through process simplification. Centralized Process (planning, engineering, construction management, materials, machinery, skilled-labour, trenching, sandfill, conduit, backfill) is replaced with a simplified Field Empowered Process (lay cable, put Snap-Pipe around cable). Allows crews to load up their pickup trucks and pace their jobs. The civil construction cost is about 70% of the undergrounding cost. Snap Pipe drastically reduces this construction component and achieves extra gains (planning and field productivity). *Snap Pipes is paid from these savings.*

6. **Is this for temporary or permanent use.**
   Except for a few, most examples in Europe, Canada and Australia are permanent. The GLDS style installations tend to be examples of Theme-a (above) driven by business case (rocky, rural, water crossing, forests, thickets) with avoided future vegetation management costs. In Theme-b (above) shallow trenching is deployed (e.g. roadside, PV farms).

7. **Explain the "click" mechanism.**
   The split pipe halves are held together by sturdy Tabs or Wedges that lock and hold them together. These Tabs and Wedges are "clicked" (locked) using a hand-held hammer or mallet.

8. **Securing and Protection**
   Snap Pipes are held together on their own. However, if additional securing mechanism is required, they have "eye-bolt holes" that can lock the two pieces together and/or be pegged to the ground. A circle-clamp can also be used.

9. **Marine and Shoreline Cable Protection**
   Snap Pipes offer marine and shoreline cable protection where undercurrents, waves, ice, freeze/thaw and winds heave the cables and cause abrasion to the cable outer PVC jacket.

10. Wildfire Protection

Snap Pipes are not fire-rated. The material melting point at (165°C/329°F) is higher than PVC (70°C/158°F) and unlike PVC does not emit toxic fumes. Temperature withstand is 100 °C (212° F) for 1,000 hours and 200 °C (392°F) for 96 minutes with no appreciable damage. Fire resistance is possible by concrete cover and/or intumescent paint coating.

11. Anchoring in Ground and Underwater

Snap Pipes do not need anchoring in flat normal ground grade/soil. In steep or rocky terrain, it can be anchored to ground using "inverted-U" (rebar) stakes. The pipes also have "eye-bolt holes" that can secure it to the ground. If lake-bed anchoring is required, the Panzar has ballast provisions (12Kg/26 lbs. and 18Kg/40 lbs) that can be bolted to the pipe prior to lowering them in water (saves time from underwater sandbags/concrete pinning).

12. Anchoring the Cable Inside the Pipe

In a few applications (steep grades), the cable needs to be "locked" inside the pipe to prevent relative movement between the two. This can be done using cable clamps inside the pipe.

13. Waterproof

Snap Pipes are not water-proof due to their flexible collar connections. The free movement of water, air, moisture allows the cable enclosure to "breathe" better than a long conduit system (where water eventually gets in and stays).

14. Compression Strength

Snap Pipes are rated per the same standards (EN 61386-24) for Compression and Impact Tests (Class N) as other underground electrical pipes/conduits. The Hardlock has a class rating of 750-N and compression strength rating of 1.13 kN for 110mm (4") nom. dia and 775 N for 160mm (6") nom. dia. The Panzer has a class rating of 1250-N and compression rating of 1.44 kN for 110mm (4") nom. dia.

15. Vandalism Protection and Repairs

Snap Pipes are tough against reasonable impact. The Panzar is much a better application in vandalism suspect applications (impact resistance 500 joules; crush at 600 kg and tensile load at 1,000 kg). No formal tests have been conducted for varying impact. Should there be any such damage, individual pipe sections can be easily replaced.

16. General Maintenance and Repair Accessibility

Since it is made of PP+EPDM (car bumper) material, no general maintenance is required. Relevant pipe-sections section can be opened up at the cable fault location. This is a big advantage over conduits or traditional direct burial.

17. UV Rating

Snap Pipes have been tested at 70 ±3 °C ambient with UVA 340 (type 1A) lamp and have UV withstand of over 3,000 direct constant-exposure hours without degradation.

18. Time and Motion Study – is it easier/faster than using HDPE

The 2022 NECA Manual of Labour Units recommends an installation time of 16.8 person-hours per 100ft of 4" sch. 80 conduit and 28.8 person-hours/100 ft of 6" sch. 80 conduit and about 1.2-1.8 person hours per elbow. While we have no formal time-motion study, we can achieve well under 0.6 person-hours per 100 ft. (2-person unskilled crew).

19. What are the Use Cases for Environmentally Sensitive Areas

Snap Pipes are well suited for very rural and environmentally sensitive areas (rock, mountains, swamps, forests, lakes) as there is little or no digging involved, and no heavy machinery disturbs the soil. The best part is that a single set of inventories will cover all such terrain. A huge time-saver and flexibility for the crew.

20. What are Key Enabling Management Processes

Adopting a resolve to lower costs by a simplified cabling process. Another would be working towards adopting revised internal engineering and construction standards that enables field flexibility. Third, would be enabling field training to gain field experience using Snap Pipes. These changes can be done concurrently using Pareto principles.

21. Suggestions for Utility Pilot/Evaluation

Each utility tends to have its own ways. The Panzar can be used for all terrains and all applications (land, water, GLDS) and would be the best to start. Hardlock can be used if difficult terrain is not present. Evaluation could include:

(a) Trial lay of 3 miles (1 mile each) of (i) GLDS, (ii) shallow trench and (iii) water body crossing.

(b) Field lay of 25 miles (5 miles each) in (i) a semi-urban/rural side road, (ii) forest thicket, (iii) water-crossing and shore, iv) rocky areas; and (v) a mountain steep grade.