World’s slimmest 432F micro cable

Enables quick and easy deployment, with lower attenuation

- Ducting and trenching is a cost and “time to service” concern. Deployment of optical fibre cable in limited duct space and in tight bend situations demands reduced diameter bend insensitive fibre
- This paper highlights 432F Next Gen Micro armed with 200 µm fibre. Meeting and exceeding ITU-T G.657.A1/A2 standards, this fibre forms an effective high fibre count cable
- 200 µm fibre results in nearly 20% slimmer cable resulting in reduced deployment cost and increased scope for network expansion
- Packed in water blocking compact design, this is a RoHS-compliant cable free from heavy metals and is environmentally friendly.

In today’s data-driven society, the demand for bandwidth continues to increase exponentially. Consumers are now using more data than ever before. In 2016, internet usage transitioned to zettabyte scale and it is estimated that global mobile data traffic alone would increase by 700% in the period from 2016 to 2021. In order to meet current network needs and be future ready, there is demand for thinner cables with higher fibre count. As telecom operators initiate process of laying optical fibre cable in the existing semi-utilized ducts, high-density fibre cables can be their optimum solution.

In order to provide efficient 5G services, there has to be an increased density of 5G access points. This puts 5G front haul networks in need for more fibre per duct, to the tune of 1728 fibre or even higher. Existing fibre-based applications such as FTTH and PON will also need additional fibre, raising the requirement to deploy cables with higher fibre density. Increasing urbanisation and rapid expansion of municipal area of cities have been leading to a rise in the number of access points. This strengthens the need to utilize higher fibre count cables connecting all the access points with high speed fibre.

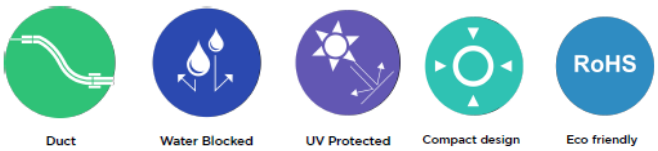
Sterlite’s Next Gen 432 OFC

This cable is a stranded micro loose tube cable with optical fibre placed inside robust buffer tubes stranded around a fibre reinforced plastic (FRP) central strength member. In addition to optical fibres, the buffer tubes contain water blocking gel and the cable core is surrounded with water-absorbing yarns to prevent water from entering cable core.

This cable contains double layer buffer tubes made out of patented technology which reduces the tube size. These tubes are hard on the outside providing robustness, and soft on the inside, allowing comfortable fibre arrangement.

The cable core is surrounded by thermoplastic sheath or polyamide jacket making it sturdy and installation friendly. In this innovative 432F micro-cable, it is much easier to handle the jacket, as compared to traditional cable jackets. While it is tight and compact, the removal of this jacket is smooth and convenient. With easier removal of the jacket, mid-span access becomes much more seamless and hence minimising the fibre damage risk.

This micro-cable ensures compatibility with existing fibres, controlling fibre durability and other parameters such as spliceability and attenuation. This helps in improving fibre density, simultaneously meeting various cable approval standards such as IEC.60794 series, ANSI/ICEA S-87-640 and Telcordia GR-20.



200 µm fibre: Innovation Inside

Sterlite’s ITU-T G.657.A1 Micro Bow-Lite single mode optical fibre is a slim optical fibre with low bend sensitivity and low water peak attenuation. A significant improvement in fibre density in optical fibre cables can be achieved by using slimmer bend insensitive 200 µm optical fibres.

Compared to a standard 250 µm fibre, the next generation fibre provides nearly 20% slimmer 432F cable. This cable has special characteristics of low bend sensitivity across the 0, E, S, C & L-bands (1260-1625 nm) in addition to low water peak, characterized by the attenuation at 1380-1390 nm being less than the attenuation at 1310nm.

Enhanced performance parameters & its impact

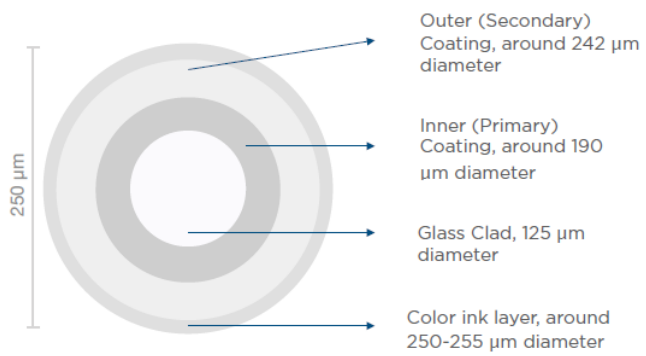
- ✓ Reduced Attenuation G.657.A1 MICRO BOW-LITE bend insensitive fibre has been employed to develop this micro-cabling solution. It is suitable for applications such as FTTH, it enables better bend radius and minimises macrobend signal losses 10-20 times.
- ✓ Reduced overall size - Tube diameter has been reduced leading to a lesser cable diameter and reduced fill factor which further enables more efficient blowing performance.
- ✓ Increased Physical Robustness - The cable has been engineered to withstand extreme temperatures in the range of -40 degree Celsius and +70 degree Celsius. The tensile strength has been augmented to 1000N.
- ✓ Ergonomic design – The operational bend radius has been altered, and currently is at 20D/15D enabling greater ease of handling in man-holes and hand holes.
- ✓ Reduced deployment cost - Reduced duct fill factor due to lesser overall cable diameter makes cable blowing to farther distance and at faster rate.

The table below displays a comparative study of the parameters and business benefits of the standard industry 432F micro-cable, and the slimmest 432F Next Gen cable innovated by Sterlite Tech

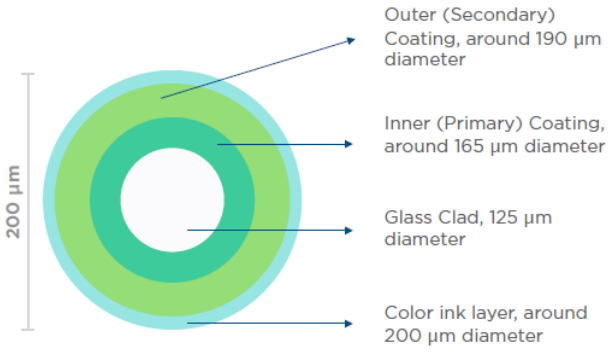
	STL 432F Micro-cable	Conventional 432F Micro-cable	Impact
Cable Diameter	8.7 ± 0.3 mm	> 9.8 mm	Smaller bend radius and weight, leading to easier installation and reduced installation costs
Fill factor (in 16/12mm duct)	40%	49%	Easier blowing through ducts
Blow performance	1.5 km	1.0 km	Quicker deployment completion

Enables effective deployment

High fibre count OFC when use in limited space and in tight bend conditions demands reduced diameter optical fibre and cable with bend insensitive fibre. Our bend insensitive 200 µm fibre packs excellent low macro-bending sensitivity, low water peak level and G.657.A1 compliance. In addition to all these benefits it also offers a reduced outside diameter for drastic reduction of cables and fibre management systems footprints and weight. It can dramatically reduce the total cost of ownership of a networks while limiting the environmental impact of its deployment. Reduction of civil works, possibility to reuse existing ducts, lower costs of pathways fees are immediate benefits.



A. Conventional 250 µm SMF



B. Sterlite Tech 200 µm SMF

Features	Advantages
Reduced coating diameter	• Results in reduced cable diameter • Easy adaptability results in reduced requirement of fibre management system footprint • Total cost of ownership and environmental impact of network deployment and upgrade
Improved OF performance	• Meeting and exceeding G.657.A1 standards • Utilization of all bands, from O- to L-Band • Future ready for system evolution (10G-PON,

	WDM-PON and beyond)
Same glass clad diameter 125 µm	• 200 µm fibres are compatible with standard cleaving and stripping tools • Easily spliced with similar settings of the fusion splice and mechanical splicing • Low loss splicing compared with similar types of fibre

- **More fibres in compact ducts**: In light of stringent regulations on new cable deployment (Right of Way etc.) and effects of digging into existing municipal infrastructure, it becomes quite difficult to upgrade network for future needs while keeping the deployment costs in check.

- **Slimmer cables, effective duct space utilization:** Micro LITE multitube cables use ITU-T G.652.D and ITU-T G.657.A1 fibres, which also include 200 µm fibre. These fibres increase buffer tube space utilization and hence effectively accommodate more fibre in given unutilized sub-duct network.

- **Small drums, longer cable length, easier handling and logistics**: 864/1728F cables that are available currently are significantly large in size and in bend radius, making it difficult to handle particularly in case of man-holes and drill holes. Hence it becomes essential to enhance cable technology to accommodate greater fibre quantities

Conclusion

The innovative smaller diameter cable enables benefits in the areas of installation process and equipment, handling, bend radius, network separation, network reliability and ability to scale network as needs grow. Higher fibre density in existing ducts will make increased number of access points at terminal locations, strengthening front haul and ready to meet the demand for 5G in the future. The usage of smaller diameter buffer tubes has decreased the fill factor and thus increased the blowing efficiency. Leveraging Access/Metro networks for FTTx such as Fibre to the Home, will become advantageous, with higher fibre counts implemented through the 432F micro-cable. Sterlite's Next Gen Micro-LITE Multitube cable equipped with 200 µm ITU-T G.657.A1 category fibre offers a novel and reliable solution to tighter bends and limited duct space demands frequently encountered in real-life network deployments.