Vértebræ Al_2O_3

PRECISION BRAKING & SHIFTING

INTRODUCTION:

Thank you for purchasing Vertebrae ceramic brake/gear lines, the most technologically advanced gear/brake housing available. Please take the time to read this information leaflet & follow the instructions to ensure the correct operation of this product and maximise its intended lifespan.

Segmented housing is designed to minimise longitudinal compression of the lines and enhance shifting & braking performance over conventional bowden cable housing.

Vértebræ ceramic brake & gear lines are manufactured from an high-purity Al_2O_3 ceramic material. With it's ultra high stiffness, each vertebra has an inherently very small amount of dimensional change as external forces are applied, resulting in fast, effortless gear changes, predictable braking with better modulation and power.

Other advantages of the vertebrae: totally corrosion free, low friction, low weight, replaceable liner, silent operation and a wide selection of availabile colours.

WARNING:

Incorrectly installed vértebræ ceramic brake lines may fail catastrophically, resulting in a sudden loss of braking ability. Please take the time to read thoroughly read these assembly instructions!

Vértebræ Components will not be liable for brake lines that were incorrectly installed, modified or tampered in any way.

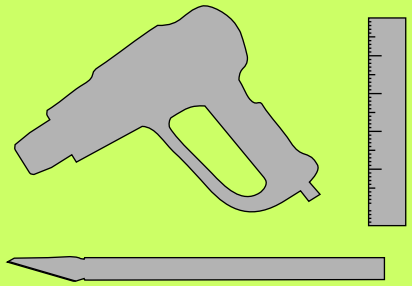
ASSEMBLY:

Vertebrae Ceramic Brake/Gear Lines can be ordered pre-assembled, minimising the intallation time considerably. If you have purchased a custom set of lines, skip the "assembly" instructions and proceed directly to the "installation" step.

To assemble your own vertebrae ceramic lines, carefully follow these instructions:

1 - Tools required.

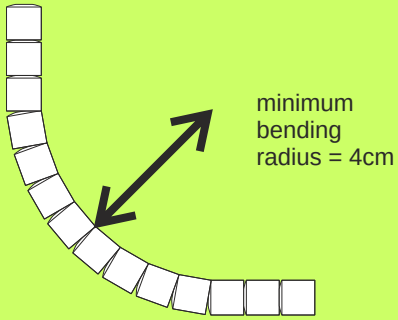
Electric heat gun, measuring tape, hobby knife.



2 - Minimum bending radius.

Note that for safe operation, the minimum bending radius of Vertebrae housing is 4cm (DIAGRAM A). Cable routing with tighter bends may cause damage to either the ceramic vertebrae or the teflon liner. Take this into account when determining the lengths of housing required in the next step.

Diagram A.

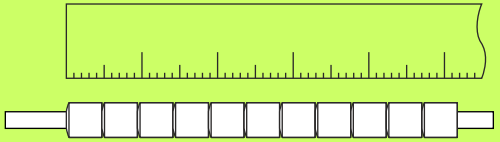


3 - Housing Length.

Measure your existing housing sections and calculate the exact lengths required. There are approximately 260 vertebrae pieces per metre (DIAGRAM B).

If you are buildng a new bike or don´t have anything to go by, assemble a long test section of housing without the Spinal Wrap using step 5 and route your cable housing as intended in order to anticipate the lengths of housing required.

Diagram B.



4 - Full length liner?

Decide if you want to opt for a full length liner or housing. If you expect to use vertebrae housing in wet, muddy, dirty or icy conditions this option is recommended to keep out contaminants. Calculate the correct length of liner required.

To simplify assembly & installation, a standard length liner is recommended (cut each section of liner about 10cm longer than its respective housing ... you can always shorten it later).

5- Vertebrae Assembly.

Thread each ceramic vertebra carefully onto the teflon liner. If you find a vertebra scratches the outside of the teflon liner/tubing upon installation, check the hole for obstructions. Some scratching of the liner is normal after hundreds of vertebrae have been threaded in place -this is normal and will not affect the correct operation of vertebrae ceramic housing.

It helps if you place a single 5mm plastic ferrule at one end of the liner to prevent the vertebrae from sliding and separating along the liner (DIAGRAM C).One method is to crush the exposed liner to help keep everything in position (you will need to cut it off later anyway as it may interfere with the operation of your derailleurs & shiftlevers).

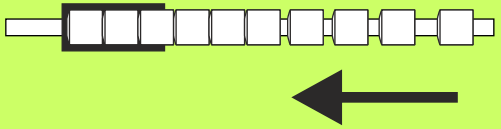
IMPORTANT: Double check that all the Vertebrae are facing the same way, with matching concave/convex end surfaces!!

Approximately two in every thousand ceramic pieces will be stuck together; sometimes these can be separated, but you should discard them for safety´s sake.

6 - Use of Ferrules?

Wherever possible, ensure that the supplied 5mm plastic ferrules are used to terminate the ends of the vertebrae gear housing (DIAGRAM C). On many modern bike components, 5mm ferrules won't fit inside

Diagram C.



frame cable-stops, barrel adjusters or shift-levers. In this case, do not try to force them; simply terminate the Spinal Wrap at the end of the ceramic housing without them (DIAGRAM D).

7 - Applying Spinal Wrap.

IMPORTANT: Ensure that there are no gaps between the adjacent vertebrae!! Push both ferrules along the liner to compress all the ceramic vertebrae as much a possible.

Place the Spinal Wrap over the housing but do not cut it yet! Preferably insert the liner & vertebrae once only. Pushing and pulling the liner and/or vertebrae inside the Spinal Wrap may cause the vertebrae to separate.

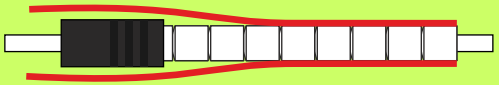
8 - Shrinking Spinal Wrap.

For best results, use an electric heat gun to shrink the Spinal Wrap over the ceramic housing (DIAGRAM D). Gas Lighters will not provide enough uniform heat. Open flames can cause the Spinal Wrap to discolour due to the smoke they produce.

Place the housing on a clean, heat resistant surface. Apply the heat source at one end of the housing and slowly move along as the Spinal Wrap contracts. Note that insufficient heat will cause a longitudinal ripple (which application of

further heat will remove). Pronlonged overheating may cause bubbling of the plastic wrap.

Diagram D.



9 - Cutting the shrink wrap.

Allow the housing to cool for 5 minutes. Finally cut the excess Spinal Wrap as shown in DIAGRAM E. Take care not to cut through the plastic ferrule during this final step!

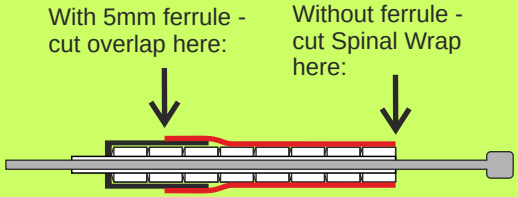


Diagram E.

INSTALLATION:

1 To install new cables and housing, first select the smallest cog/chainring combination available on your gear shifters.

2 Road brake cables are marked "CC". Gear cables are marked "SS".

3 Thread the brake / gear cables through the shiftlever *before* you insert the housing itself into the brake/shiftlever bodies (that way you can easily see the cables and thread them through the liner in the housing). For best results, before making any fine-tuning adjustements or riding the bicycle for the first time, apply some tension to the brake/gear cable; this will compress the vertebrae together inside the housing, eliminating any microscopic gaps.

4 Put the chain onto the smallest cog/chainring. Set the cable tension so that it is neither slack nor taught enough to begin to move the derailleur to the second position cog.

5 You only need a 4 or 5mm allen key to tighten the cable cinch bolt.

6 If the rear derailleur hesitates before changing up to a larger sized cog, tighten the cable tension by turning the barrel adjuster 1/4 turn anti-clockwise. Likewise, if the rear derailleur hesitates before changing down to smaller-sized cog, slacken the cable tension by turning the barrel adjuster 1/4 turn clockwise.

7 Finish off by cutting the stainless steel cables and applying one of the supplied end-crimps. These stop the cable from prematurely fraying.

MAINTENANCE:

We do not recommend the use of any lubrication on the housing or cables. The pure teflon liner has one of the lowest coefficients of friction of any man-made or synthetic material.

Applying liquid lubricants attracts dust and dirt, which can have the oppposite effect to that intended - actually degrade the performance.

High Purity Alumina and Teflon are both practically immune to corrosion, but the outer protective polyolefin sleeve is not. Please avoid the use of strong solvents and acids.

Inspect the lines carefully & periodically; if you notice any defects or cracks in the housing - specifically the ceramic parts- STOP USING THE LINES IMMEDIATELY!! Realise that not doing so could pose a risk of injury due to mechanical failure.

When the time comes to replace gear or brake cables, please only use new ones; cut cables are sharp have a tendency to scratch the teflon liner internally when inserted. The use of 1.5mm brake cables is also required; vertebrae ceramic housing is not compatible with 1.6mm brake cables.

Should you need to remove or replace the Spinal Wrap in future, take care when slicing off the old Spinal Wrap - owing to the high hardness of aluminium oxide, our vertebrae have a tendency to blunt metal hobby knives, leaving a grey mark (actually this is metallic residue). This is merely an aesthetic concern if you intend to resuse vertebrae with a clear Spinal Wrap finish; these marks will not affect the structural integrity of vertebrae ceramic housing.

TROUBLESHOOTING:

How do you cut Vertebrae cable housing?

If you need to reduce the length of verebrae ceramic housing, first cut through the outer spinal wrap polymer layer with a sharp knife. Make the first cut circumferentially at the appropriate place, then slice the spinal wrap longitudinally up to the first cut. Next, slide each of the ceramic vertebrae off the teflon liner one by one. Once you can see the white teflon liner underneath you can simply cut that to the required length.

On the other hand, cutting the housing in half must be done carefully so as to keep both halves of the liner and spinal wrap intact. NOTE: to gain access to the liner in order to cut it, you may inadvertantly stretch the teflon liner if you pull the two housing sections apart with too much force. The best method is to use a sharp hobby knife without applying too much tension to either side of the housing.

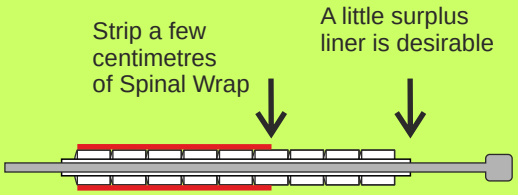
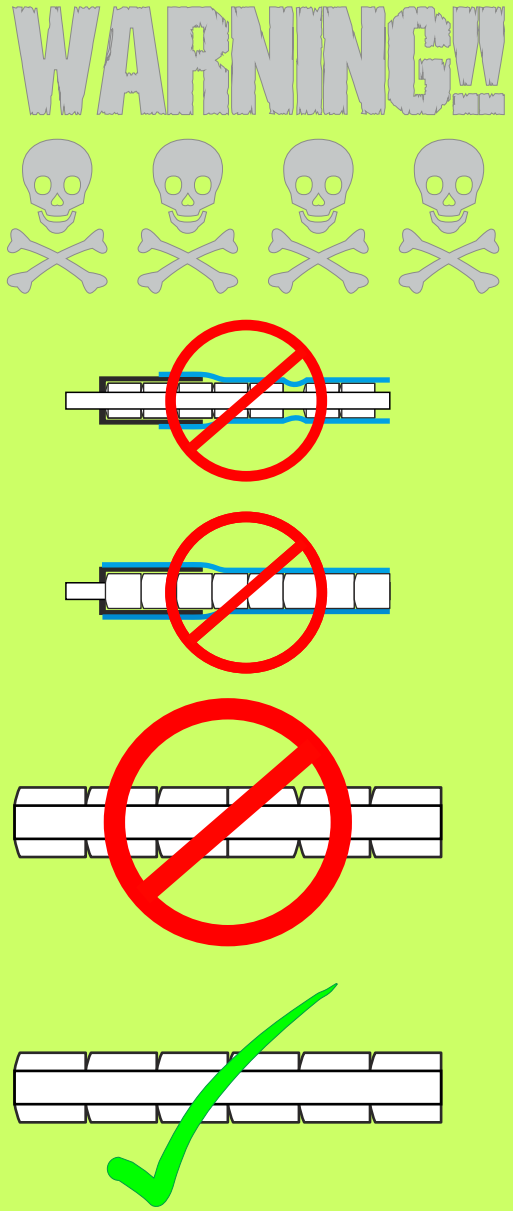


Diagram F.
2009 CAMPAGNOLO GEAR HOUSING

Known fit issues with Campagnolo "Ultrashift" ergolevers:

2009 and newer ergolevers were built for campaganolo's own proprietry 4.1mm shifter cables. Therefore, to make vertebrae gear housing to work, you'll need to drill out your 2009 campagnolo lever bodies slightly. It's best to select a drill bit between 4.6 and 5.0mm. A drill bit with a 4.8mm diameter is ideal. *Turn the drill bit by hand rather than using an electric drill so you have more control. It's important to stop when you reach the bottom of the existing hole.* After you perform this easy modificiation, you can use any standard derailleur housing you like.



For more up to date information, please visit our website:

http://www.vertebr.ae