



LINXION

THE ORIGINAL

CATALOG DEVIATOR TUBES

CREATOR OF TECHNICAL SOLUTIONS

(BARTEC Group)

KNOW-HOW

With more than 30 years of know-how, Linxion is your partner in the study and production of rigid cable deflection sheaths :

- **Deviator tube** : Galvanized steel cable deflection tube for prestressing by post-tension external to the concrete
- **Rigid internal guide** steel sheath for adherent or non-adherent prestressing.

Linxion has been **ISO 9001** certified for over 10 years. It brings you technical expertise according to your dimensional constraints.

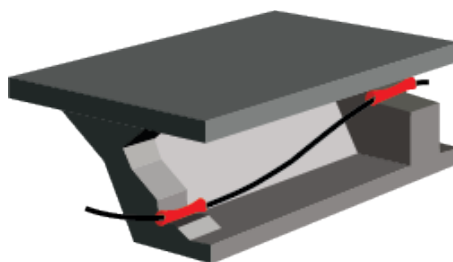
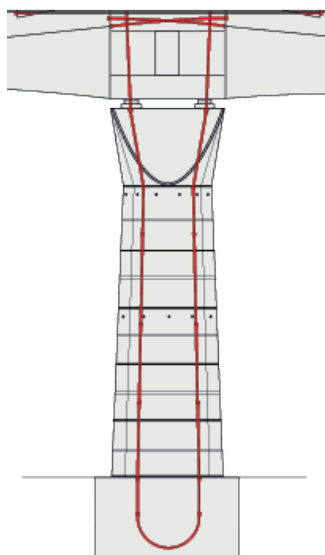
Our design office will help you study and manufacture your tubes according to your requirements while respecting a **permanent quality process**.

All of our products are rigorously controlled in order to **guarantee optimum quality of geometry and installation**.

All our achievements are subject to unit traceability by mechanical engraving.

For external post-tensioning applications (diverter tubes), we provide **you with the service and control of hot-dip galvanizing**.

Our stock of the most common tubes ensures you a **very good reactivity for the realization of your sites**.



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DEVIATOR TUBES

FOR NON-ADHERENT EXTERNAL POST-TENSION

Our deviator tubes are made of galvanized steel. Mostly used in structures where **external post tensioning is required** with individually sheathed and greased strands.

These cables are installed on the external surface of concrete structures. The post tensioning prestressing system **allows access to the strands for their maintenance** and replacement. Indeed, these are likely to be re-energized or replaced. They are ideally **suited for inspections and long-term maintenance**.

The deviator tubes are usually used for bridges and viaducts with prefabricated segments. The sheaths are independent from the structure and can slide freely in concrete.

The objective is to give **a deflection angle** to the prestressing cables in order to follow a defined path **guaranteeing the integrity of the main sheath**. The prestressing cables that are in the open air inside the tubes could be replaced. Thus, the deviator tubes are hot-dip galvanized **to protect them from corrosion**.

Our deviators are made from 12 meter long tubes on which we perform various **cold deformation operations** such as cutting, bending and flaring according to your needs.

RAW MATERIAL

Its suitabilities ?

The raw material used for the manufacture of the tubes is steel in grade **E235 Quality 2 (S235 JRH)** with internal scraped weld seam.

Our tubes comply with the regulations for tubes welded longitudinally by pressure, cold finished and in accordance with **standard NF EN 10219**.

ISO 9001:2015

BUREAU VERITAS
Certification



Its Grade and Requirements

The material used makes it possible to meet the bending skills, to the flaring of the ends as well as to hot-dip galvanizing (**Class I - II steels**).

A **3.1 certificate** of the subject can be provided to you on request.

External post-tensioning : DEVIATORS				
In Stock	O.D. (mm)	Wall (mm)	Length (mm)	For HDPE Ductwork (mm)
	108.0	2.0	12000	90
	133.0	3.0		110
	159.0	4.0		125

Order with delay	139.7	3.0	12000	110
	168.3	4.0		140
	177.8	4.0		140
	193.7	4.0		160
	219.1	4.0		180

Please consult us for other dimensions or thicknesses.

BENDING

Field of use

The purpose of the bending operation is to give a curvature to the deflector tube which corresponds to the deflection angle of the previously defined cable.

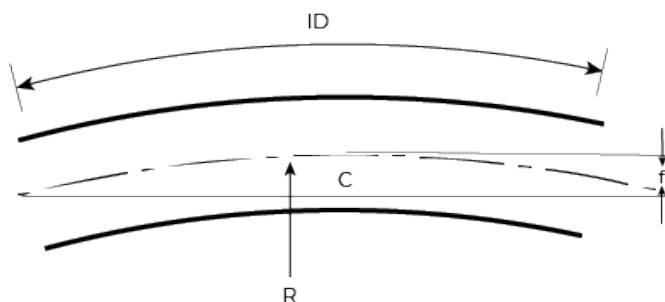
Its guarantee

The bending guarantees the correct path of the cables in the structure. A precise realization of the curvature of the bending ensures an increased longevity of the sheaths and a greater ease of implementation.

Our high-performance production equipment adapted to the different diameters of diverter tubes allows us to guarantee you a low percentage of out-of-roundness.

The clearance between the tube and the sheath must be greater than or equal to 10 mm.

For a good execution, you must provide us with the radius to the neutral fiber of the tube.



F : Deflection

C : Chord

ID : Developed Length on neutral fiber

R : Bending Radius

External post-tensioning : DEVIATORS

In stock	O.D. (mm)	Wall (mm)	Mini. radius (mm)
	108.0	2.0	2000
	133.0	3.0	2000
	159.0	4.0	3000

Order with delay	139.7	3.0	3000
	168.3	4.0	3000
	177.8	4.0	3000
	193.7	4.0	3000
	219.1	5.0	3000

Please consult us for other dimensions or thicknesses.



FLARING

Flaring use

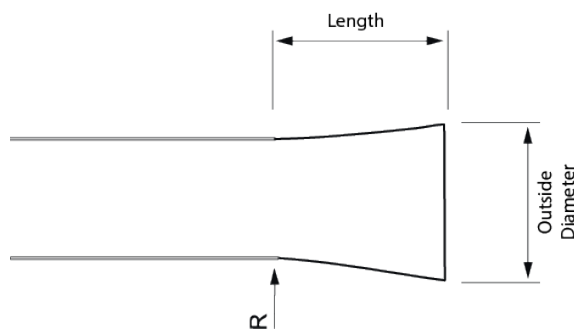
The tulip allows the flaring at the entry and / or exit points of the deflection devices to the right of «concrete partitions» without damaging the sheath. Flaring is carried out at the end of the tube with a predefined radius of curvature according to the table below.

Its advantages

Our manufacturing process provides you with many advantages, such as continuity of shape without edges or welds, which thus allows full respect for the integrity of the sheath and the routing of the cable. **You will also benefit from a lower manufacturing cost due to the absence of any cone added by mechanical welding.**

Our mastery of cold deformation makes it possible to preserve the mechanical characteristics of the diverter tube. The reliability of our production prevents the risk of weld breakage.

We guarantee a more reliable result and achieved in less time.



For optimal result, flare must be operated on straight pipe length

External post-tensioning : DEVIATORS

In Stock	O.D. (mm)	Wall (mm)	Max O.D (mm)	Flare Length (mm)	Flare Radius (mm)
	108.0	2.0	120	150	1878
	133.0	3.0	155	200	1824
	159.0	4.0	182	250	2723
Order with delay	139.7	3.0	165	200	2477
	168.3	4.0	185	250	3747
	177.8	4.0	207	300	4000
	177.8	5.0	195	200	2330
	213.1	5.0	230	200	2190

Please consult us for other dimensions or thicknesses.

POSITIONING

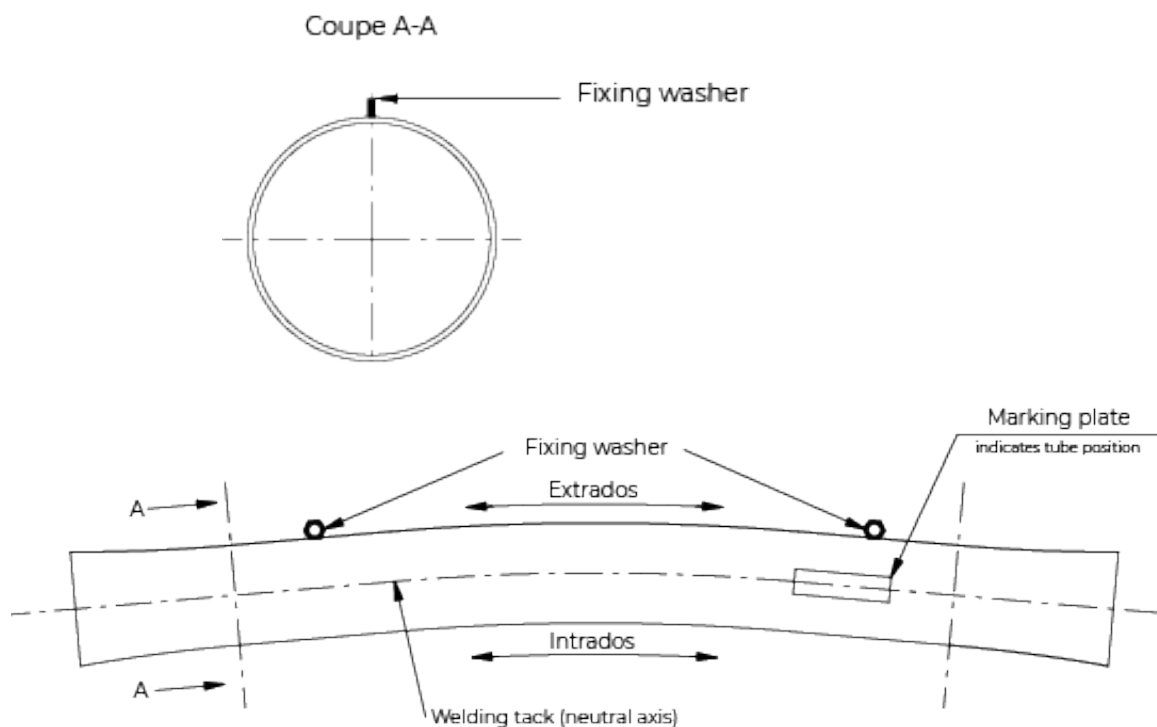
Features of positioning

Two nuts are welded to the tube to facilitate its installation on site. By suspending the deflector by these rings, **it will naturally be positioned in the desired orientation plane.**

An identification plate will give you the direction of assembly of the tube, previously defined with the customer : positioning of the plate at a given end and positioning on the lower surface or upper surface in the case of bent pipes (see chapter 5).

Advantages

We ensure the delivery of an **optimized product, ready to be installed and adjusted on the job site.** You will benefit **from an ease of installation** thanks to the angular marking which defines the inclination of the deflection angle.



During the installation on the construction site, you will have only to respect the tube tilt. Our service is only an aid for positioning, it shall not replace verification and tube assembly.

Linxion can not be held responsible for bad installation on the construction site.

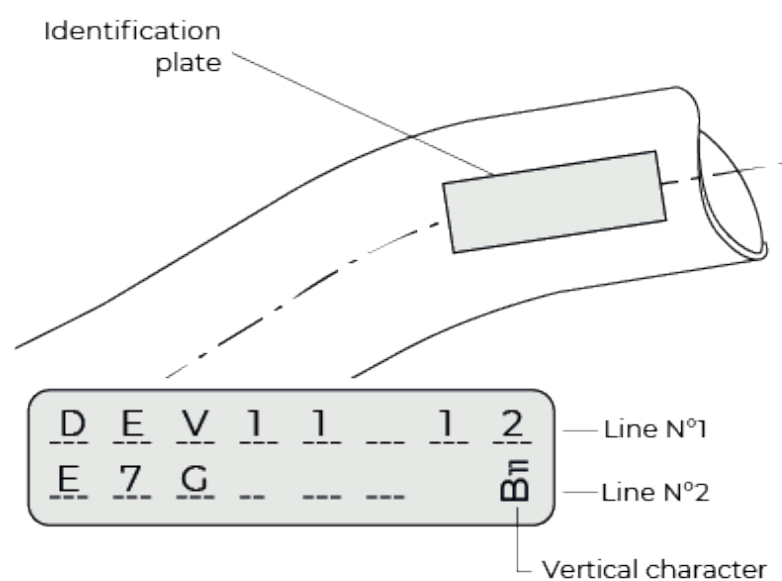
MARKING/TRACEABILITY

Advantages

With this identification, **you no longer have the risk of mixing tubes of similar design**. In addition, the tube will be mounted in the correct mounting direction. The characters of the identification are defined by the customer and then registered by mechanical engraving for a longer life.

This plate **avoids you an installation error**, it ensures and facilitates :

- Product traceability
- Identification of manufacturing orders.
- The identification of tubes from the same production order, thanks to the reversed letter.



TUBE REFERENCE

Line N°1: up to 10 characters

Line N°2: up to 10 characters

SHIPMENT REFERENCE

Vertical character :
indicates the tube manufacturing tracking code. It is the same for every tube coming from the same delivery note. It is followed by an internal codification number.

GALVANIZATION

Hot dip galvanising ensures the deviator pipe **corrosion protection**. The galvanizing process offers the protective coating : adhesion, impermeability and increased mechanical resistance.

The **EN ISO 1461** standard impose a minimum :

- 55 μm for a steel thickness between 1,5 et 3 mm
- 70 μm for a steel thickness between 3 et 6 mm
- 85 μm for steels thicker than 6 mm.

SURFACE TREATMENT

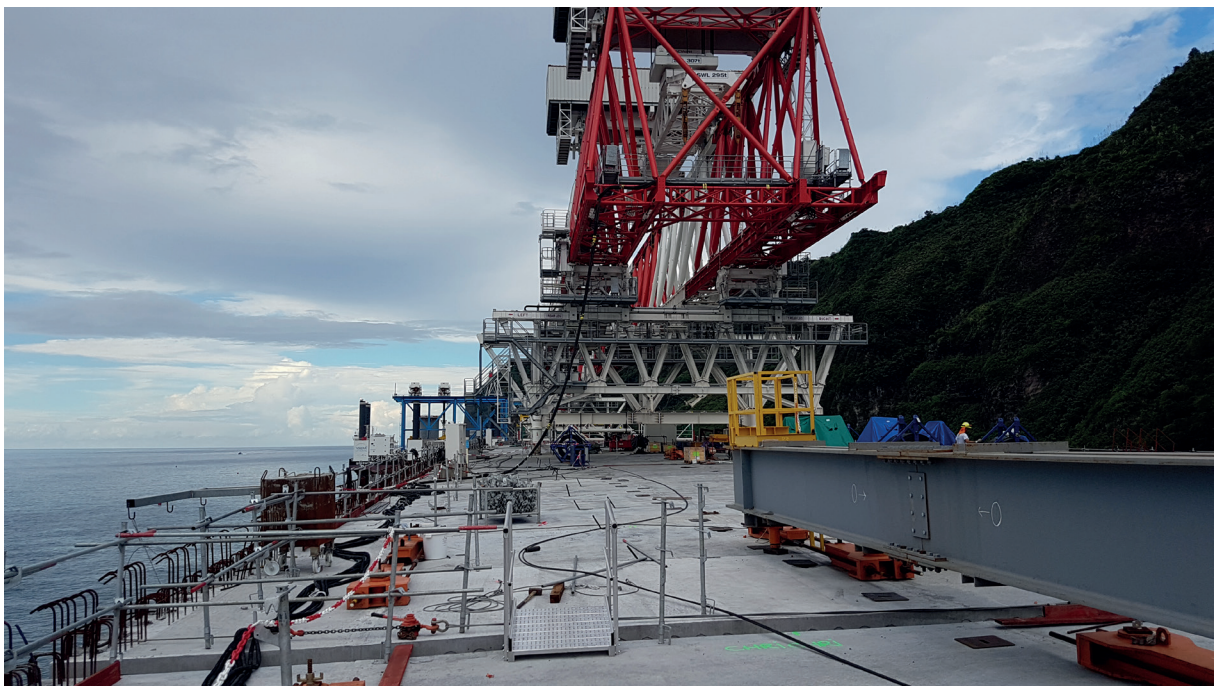
Hot dip galvanising as per **norms NF EN ISO 1461**. Minimum coating thickness specified by the standard; 55 μm (Measured value: from 70 to 100 μm)

REALIZATION

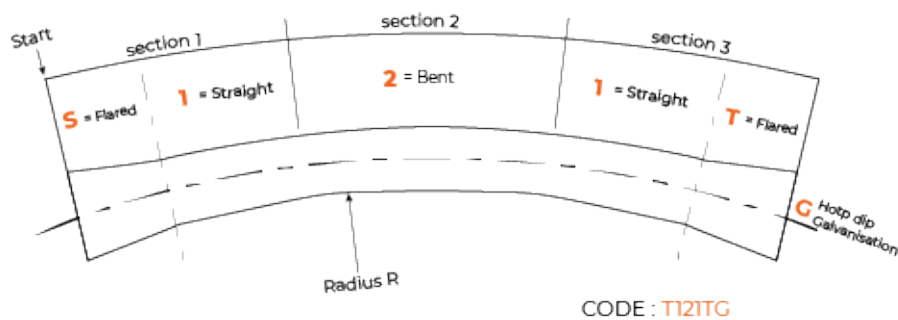
Handled by specialist sub-contractors. This service is achieved within the frame of the contractual **Quality Assurance System**.

INSPECTION

A **galvanization certificate** will be provided for each batch upon request.



SHAPE CODE



The shape code makes it possible to easily know the geometry of the tube without having to resort to the plan. This shape code will **save time** at the reception of the quote.

ENDS

D → STRAIGHT end
T → FLARED end
S → SWAGED end

SECTION SHAPES

1 → STRAIGHT section
2 → BENT section (clockwise)
3 → BENT section (anti-clockwise)
4 → SPLAY cut (where feasible)

CORROSION PROTECTION

G → Hot dip galvanisation
N → None

The background of the slide is a photograph of a construction site. In the upper portion, a worker in a hard hat and safety vest stands on a gravel surface next to a large pile of rusted steel reinforcement bars (rebar). To the right, there's a concrete slab with some construction equipment. The lower portion of the image shows a dense grid of rebar, with several large, light-colored cylindrical rigid guiding pipes installed vertically within the structure.

RIGID GUIDING PIPE

FOR ADHERENT OR NON-ADHERENT INTERNAL POST-TENSION

Our rigid ducts are made from **steel tubes**. They are embedded in the concrete and allow the guidance of strongly deflected strands in the structure for adherent or non-adherent prestressing.

The assembly of these tubes together is done by **successive interlocking to make perfectly sealed conduits**. In the event of adherent internal prestressing, a concrete grout will be injected into the tube at the end of the operation.

These sheaths are most often used for :

- Temporary nailing of segments on viaduct piers (VSP)
- The pretension of the gas tank envelopes.
- The production of aircraft hulls for nuclear reactors.
- Internal loops of prestressed floors.

RAW MATERIAL

Its grade and Requirements

Grade **S235 JRH Quality 2** steel, with inside seam removed or not, is used as a raw material in the manufacture of our tubes.

Our tubes, by being longitudinally welded and cold formed, are compliant to **NF EN 10219 requirements**.



Its suitabilities

This raw material is suitable for bending, swaging and hot-dip galvanizing (Steel Cat. I - II).

A **3.1 material certificate** can be provided on demand.

Internal post-tensioning : NAILING TUBES			
In stock	O.D. (mm)	Wall (mm)	Length (mm)
	88.9	2.0	6000
	101.6	2.0	
	108.0	2.0	
Order with delay	80.0	2.0	6000
	114.3	2.5	
	168.3	4.0	

Please consult us for other dimensions or thicknesses.

BENDING

Function

The bending operation is a **mechanical deformation process** that applies a radius of curvature to the tube. A prestressing conduit is thus created to **guide the strands in the concrete**.

Required qualities

The bending guarantees the correct path of the cables in the structure. A precise realization of the curvature of the bending ensures an increased longevity of the sheaths and a greater ease of implementation.

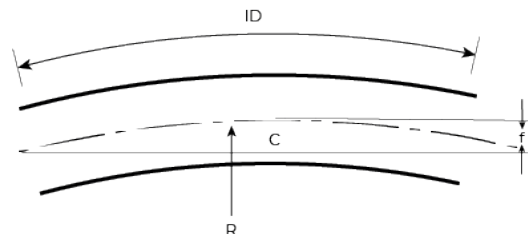
Our high-performance production equipment adapted to the different diameters of rigid ducts allows us to guarantee you a low percentage of out-of-roundness. The clearance between the tube and the sheath must be greater than or equal to 10 mm. For a good execution, you must provide us with **the radius to the neutral fiber of the tube**.

F : Deflection

C : Chord

Id : Developed Length on neutral fiber

R : Bending Radius



Internal post-tensioning : NAILING TUBES

In stock	O.D. (mm)	Wall (mm)	Mini. bending radius (mm)
	88.9	2.0	850
	101.6	2.0	1500
	108.0	2.0	1500
Order with delay	80.0	2.0	1000
	114.3	2.5	2000
	168.3	4.0	2000

Please consult us for other dimensions or thicknesses.

SWAGING

Function

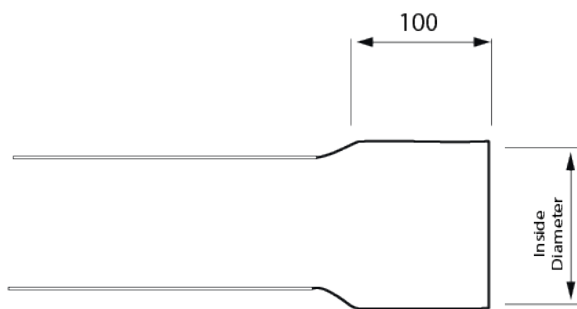
The swaging procedure **increases the inside diameter of the end of the tube.**

Thus, the tubes can be butted in the case of long lengths, complex shapes (nailing type) or on two separate bending planes.

Process benefits

Our manufacturing process gives you several advantages, including coaxiality of the tube and the slip part as well as control of the inside diameter of the slip.

Sliping ensures continuity of shape, without sharp edges or welds, for total respect for the integrity of the cable and the sheath when it is inserted.



Recommendation

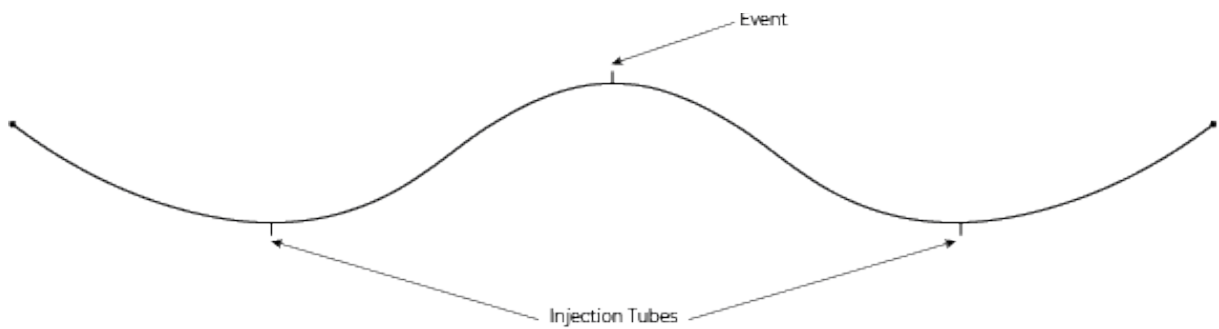
For optimal results, swaging must be performed on a straight section of pipe

Internal post-tensioning : NAILING TUBES				
In stock	O.D. (mm)	Wall (mm)	Max I.D. (mm)	Length (mm)
	88.9	2.0	94	100
	101.6	2.0	109	100
	108.0	2.0	115	100
Order with delay	80.0	2.0	86	100
	114.3	2.5	123	100
	168.3	4.0	173	100

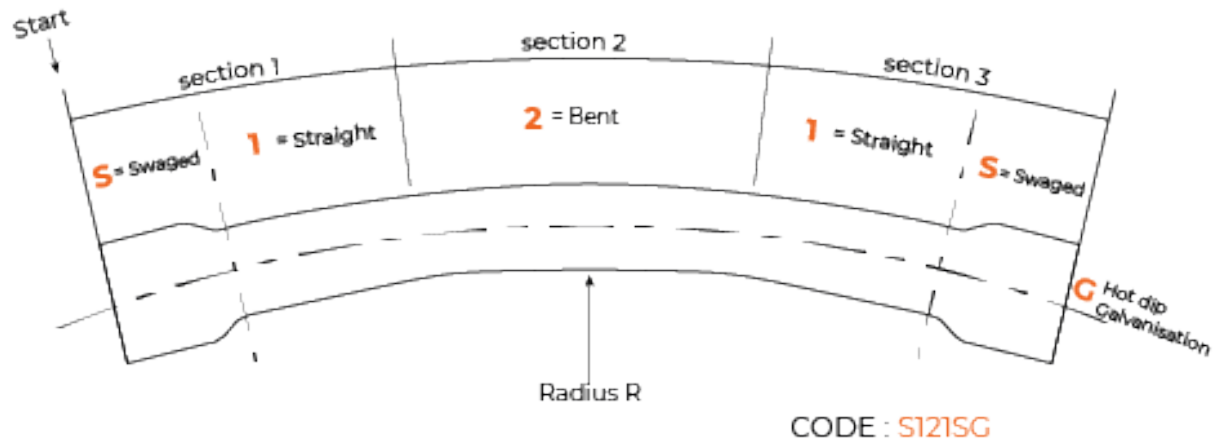
Please consult us for other dimensions or thicknesses.

INJECTION TUBES AND VENTS

On request, we position vents and injection tubes on our rigid ducts. In fact, for the protection against corrosion to be effective, it is necessary to ensure that the ducts are completely filled, without an air pocket that could constitute a zone of accumulation of infiltration water. The vents are located at the high points of the deflected cables and the injection tubes at the low points (see diagram below).



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CORROSION PROTECTION

G → Hot dip galvanisation
N → None

COMPLEMENTARY OFFERS

We can also meet your specific needs in the post-tensioning field, such as :

- Stainless steel
- Clamps
- Flange
- Fishtail anchors
- Tailor-made flarings
- Centering plugs
- Threadings
- Mechanized welding

LARGER DIAMETER & GREATER LENGTH TUBES

In both straight or curved length
With or without clamps and welded accessories

AUTRES TRAITEMENTS DE SURFACE

Zn metal spraying
Painting
Polishing

MACHINERY

On-site installation of production equipment



REFERENCES

LINXION The Original's splicing systems are
n°1 on the international market !



MÉTRO CAIRE - EGY



ROUTE DU LITTORAL - RE



PONT VASCO DE GAMA
- IT



PONT ÎLE DE RÉ - FR



LGV TOURS BORDEAUX
- FR



VIADUC DE COMPIÈGNE
- FR



HS2 - UK



VIADUC DE LA
DORDOGNE - FR



ROUTE DES TAMARINS -
RE



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