Technical Assessment 3/06-460

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Only the original text in French is considered to be authentic.

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The translated text contains 16 pages

Système de fixation

Fixing device (collar)

Festlegungsystem

SPIT PULSA Collars

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Commission in Charge of Issuing Technical Assessments
(Decree of December 2, 1969)

Specialised Group no. 3

Structures, floors and other structural components

Presented for registration on

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Specialised Group no. 3, of the Commission In Charge of Issuing Technical Assessments on March 28, 2006 examined the device for fixing ducts, tubes or electric cables, « SPIT PULSA Collars », manufactured and marketed by Société SPIT. Concerning this device, it formulated the following Technical Assessment, which cancels and replaces Technical Assessment 1+3/00-761.

1. Brief definition

1.1 Brief description

The fixing device, SPIT Pulsa Collars, for electric cables, is designed to fix electric cables, ducts or tubes.

It is installed by using a gas powered nail driver on most surfaces of concrete structural parts, notably on the underface of slab type flooring, of concrete of ordinary aggregates, strength Class C20/25 minimum to C50/60 maximum, that is, reinforced concrete slabs, poured *in-situ*, honeycomb slabs or underslabs, pre-stressed or not.

This nailing is done by means of a SPIT Pulsa 1000E or SPIT Pulsa 700^{E} gas powered nail driver.

The anchoring elements are tapered end nails. These nails are fitted with a penetration limiter, that is, a deformable plastic ring.

The suspension elements of polyamide 6.6, according to ISO 1874, with neither halogen nor silicone, or of polypropylene are:

- Collar with fitting,
- Fitting for COLSON collar,
- Collar with fitting for extra heavy IRL tubes.

1.2 Identification

The fixing devices are identified by the inscription « LEGRAND » in relief or by the references of the « SPIT » product line.

Steel stud C6/15 or C6/20, hardness HRc 54 ± 2, steel stud SC6/15 or SC 6/20, hardness HRc 56 ± 2, steel stud HC6-17, HC6-22 and HC6-27, hardness HRc 53-56:

- The letter « S » is stamped on the head of each nail or stud.
- The code and the traceability number of the studs or of the fixing elements are indicated on all the packings.

The traceability number of the aerosol generators appears on each generator.

The serial number of each SPIT Pulsa 1000 E or SPIT Pulsa 700 E gas powered nail driver is engraved on the plastic housing.

2. Assessment

2.1 Accepted field of application

Fixing by nailing, inside ordinary buildings (mainly those designed for apartments, schools, hospitals and office buildings, for normal use conditions, that is, conditions free of fatigue strains), for electric cables, ducts or tubes, the loads from which do not exceed 10 daN per fixing element, on most surfaces of concrete walls, notably on the underface of slab type floorings, of concrete of ordinary aggregates, strength Class C2025 minimum to C50/60 maximum, that is, reinforced concrete slabs, poured *in situ*, honeycomb slabs or underslabs, pre-stressed or not.

This type of fixing element is not authorised on the underface of joists.

2.2 Assessment of the system.

2.21 Conformity with the laws and regulations in force and with other criteria relating to the suitability for the application.

Stability

The stability of the light equipment, defined above, the use of which shall be limited to the applications of the suspension elements specified in this Assessment, can be legitimately affirmed.

Given the prior verifications, specified for each case of application, the implementation of which entails no particular difficulty and, given the limitations of locations of nails in the concrete (Technical Specification Book, Paragraph 2.3.1.), it is estimated that this fixing system is unlikely to affect neither the integrity nor the strength of the underlying structure.

Fire safety

In itself, this fixing system has no particular influence on safety in case of fire.

Its possible use for suspending electric cables (with or without duct or tube) that need to resist fire, must be subjected to a special study depending upon the cases to be dealt with from this point of view.

Accident prevention during the installation of the system.

Accidents are normally prevented when properly using the SPIT Pulsa 1000 E or SPIT Pulsa 700 E gas powered nail drivers and their associated accessories. The SPIT Pulsa 1000 E or SPIT Pulsa 700 E gas powered nail drivers are equipped with systems for triggering safety, safety against inadvertent firing in case of falling, safety with relation to bearing surfaces and cocking safety.

The SPIT Pulsa 1000 E or SPIT Pulsa 700 E gas powered nail drivers and their associated accessories are attested to be in conformity with the directives relative to « Work Equipment ».

When used as intended, this system utilises indirect firing; the piston, the travel of which is limited within the fitting, transmits the load's power to the fixing piece, reducing the risks of perforation of the substrate, given compliance with the utilisation precautions mentioned further on in 2.2.4.

The SPIT Pulsa 1000 E or SPIT Pulsa 700 E gas powered nail driver is repetition type « indirect firing » tools. Furthermore, the handling should only be entrusted to a duly qualified operator under the responsibility of the Head of the Contracting Firm.

2.22 Durability-Servicing.

It is considered that the connection, constituted by this fixing system, has a durability at least equivalent to that of the electric cables, ducts, tubes or of the electric conduits supported.

2.23 Manufacture of the parts.

The manufacture requires care and continuous self-inspection.

2.24 System installation.

The system shall be installed by the installation contracting firm in compliance with the instructions set down by the holder of the Assessment in the « Technical File prepared by the requester » and in the instructions in Paragraph 2.3 further on.

The Assessment's holder provides its technical assistance to the contracting firms to which it supplies these systems.

The concrete aggregates, when they come from relatively hard rocks, may have the tendency to deform the hook shaped nails to the degree that they cause a chipping off on the concrete's surface; in such cases, the system is not usable on this type of substrate, and this can be verified by the prescribed prior testing.

Although a chipping off of the concrete's opposite face of the honeycomb cells of the honeycomb slabs is possible, depending on the combination of the two parameters, concrete strength and concrete thickness next to the cells, the self-inspection, by the installer, in every case, makes it possible to be sure that the nail's strength is obtained.

2.3 Technical Specification Book, specific to the Pulsa Collar SPIT fixing system.

2.31 Guidelines for manufacturing the parts.

The manufacture of the parts constituting these fixing systems shall be subjected to a continuous self-inspection.

2.32 Guidelines for storage and transportation.

Each of these types of fixing system shall be delivered in clearly identified batches, and a gas recharge is to be delivered with each box of nails or studs.

2.33 Installation guidelines.

- The number and distribution of the fixing devices shall be determined in such a way as to have multiple fixing points per element, depending upon the permissible characteristics of the elements hung (electric cables, ducts and tubes, light-weight conduits) so as to limit

the load applied to each fixing device to 10 daN, except for the single SPIT P-CLIP, SPIT E-CLIP and SPIT fixing rod elements for which this load shall be limited to 2.5 daN.

- The device for setting in the fixing elements is exclusively the SPIT Pulsa 1000 E or SPIT Pulsa 700 E gas powered nail driver.
- In each application case, the contracting firm installing the system shall perform preliminary validation tests (see Technical File § 4.2.2) so as to:
  - verify the applicability of the system to the underlying concrete; in particular, in the case of concretes with high characteristic strength, it needs to be checked whether the firing does or does not cause concrete chipping off and whether the minimal penetrability rate, recommended in § 4.2.2 of the Technical File, is obtained;
  - determine the power setting to be used, beginning with the lowest power, then increasing it if necessary;
  - for the power selected, make sure that the maximal penetration depth of the nail remains less than 11 mm for the nails 15 mm long (studs C6/15 and SC6/15) and 16 mm for the nails 20 mm long and the nails of series HC6.
- The fixing device shall be positioned at a minimal distance of 60 cm from the extremities of pre-stressed honeycomb slabs, 30 cm from the extremities of pre-stressed underslabs, 10 cm from the edges in all the other cases.
- The minimal placement distance between fixing elements is 10 cm in every direction, including the case of impenetrability.
- When the installation of the fixing systems requires erecting scaffolding, its organisation shall be designed based upon the particularities generated, especially those due to the recoil from the percussion, so as to effectively provide operator safety.

The guidelines set down during the design of the works shall be strictly applied, notably those concerning the power setting to be adopted.

The fixing systems shall not be installed except on substrates of concrete of current aggregates, strength Class C20/25 minimum to C50/60 maximum.

The embedment of the underlying concrete elements pre-stressing rods shall not be less than 17 mm for the pre-stressed underslabs and 25 mm for the honeycomb slabs.

Under the responsibility of the Contracting Firm's Head, the personnel shall be duly qualified for the use of the equipment and shall comply with the rules concerning safety and protection of health of personnel, notably wearing individual equipment, including, in particular, protective goggles and hearing protections.

The Contracting Firm's Head or his representative, shall notify the other participants, simultaneously present on the jobsite, of the necessity of wearing hearing protections.

Conclusions

Overall evaluation

The use of the system in the accepted application field is favourably assessed.

Validity

5 years until March 31, 2011.

For Specialised Group no. 3
The Chairman

JP. BRIN

3. Complementary remarks from Specialised Group no. 3 (draft)

On the occasion of the revision of Technical Assessment 1+3/00-761, Société SPIT has added to its Technical File with a new line of nails (series HC6, available in three lengths), as well as new SPIT suspension accessories.

Specialised Group no. 3 once again emphasises the pertinence, during the choice of the fixing technique, with regard to the jobsite's imperatives, of the requirement that the criterion be incorporated according to which this system, under the installation conditions, in compliance with the manufacturer's specifications and covering a large number of shots, will have a measured frequency of placement faults of 12% in a concrete, strength Class C20 and 28%, in a concrete, strength Class C50. In particular, it is necessary to be attentive to the choice of the nail based upon the substrate's strength, as recommended by the holder in the first paragraph of its Technical File. For concretes of classes greater than those covered by the Assessment, the rate of impenetrability indicated by the tests increases rapidly and can reach 50%.

The original tests carried out at CSTB had made it possible to establish the guidelines for positioning the Collar PULSA SPIT fixing elements on the underface of the most usual floors so that they do not impair the structural integrity of these floors. These guidelines are maintained on the occasion of this revision. In particular, the Group considers that the probability of simultaneous damage to two underslab reinforcing rods is negligible.

The placement of these fixing elements on the underface of poured floors of self-positioning concrete was not studied in the context of this Technical Assessment.

The Rapporteur of Specialised Group no. 3

M.CHENAF

Technical File
prepared by the requester

A. Description

1. Intended use and definition

The associated fixing systems: studs SPIT C6/15, C6/20, SC6/15, SC6/20, HC6-17, HC6-22 or HC6-27 and LEGRAND suspension elements, collars with fitting, Ref. 319.00 / 319.02, fitting for COLSON collars Ref. 319.59 / 318.99, or collars with fittings for IRL tube, extra heavy, Ref. 319.63 / 319.64, as well as the suspension elements, SPIT CT-CLIP, E-CLASP, E-CLIP, METAL HOOK, P-CLIP single and double, CLIPELEC. Single and double fixing rods are designed for fixing electric cables, ducts and tubes, installed by nailing on the surface of the parts of the structure of concrete, and notably walls, surface and underface of floors of concrete of ordinary aggregates, strength Class C20 minimum to C50/60 maximum:

- Reinforced concrete, poured *in situ*,
- Honeycomb slabs or underslabs, pre-stressed or not.

These systems use a SPIT PULSA 1000 E or SPIT PULSA 700 E type gas powered nailer, equipped at the origin with a retaining groove stud guide, making it possible to verify the proper operation of the fixing.

Nails C are mainly intended for concrete C20/25, nails HC are mainly intended for concrete C50/60 and for the honeycomb slabs. Nails SC are multipurpose.

2. Materials

2.1 Materials constituting the system

2.11 Anchoring elements

These are tapered point studs: stud C6/15 of steel hardness HRc 54 ± 2, stud SC6/15 or SC6/20 of steel hardness HRc 56 ± 2, stud HC6-17 or HC6-22 or HC6-27 of steel hardness HRc 53-56 (see figure in Appendix).

Electrogalvanising 5 µm minimum, marking (S) at the head.

2.12 Penetration limiter

The guide strip receives 20 studs, forced in place. This strip is of deformable plastic.

2.13 Suspension elements

2.131 Collar with fitting – Ref. 319.00 or 319.02

- Function: holding and suspending IRL tubes and cables.
- Material: polyamide 6-6 according to ISO 1874, with neither halogen nor silicone.
- Colour: light grey, RAL 7035 Ref. 319.00
  black, Ref. 319.02.
- Marking: LEGRAND in relief.
- Gripping capacity:
  Cables: ∅ mini 15 – ∅ maxi 30
  IRL tubes: ∅ 16 – ∅ 20 – ∅ 25 – ∅ 32.
- Overall dimensions: see drawings in Appendix.
- Non-flammability:
  test of the heating filament: 850°C / 30 s, according to NF EN 60-695,
  V2 according to UL 94.
- Use: inside ambience: Ref. 319.00
  outside ambience: Ref. 319.02
- Installation: T°C: -7°C / +49°C.
- Use: T°C: -25°C / +60°C.
- Check *in situ*: extracting Pulsa 1000 E or Pulsa 700 E, with a force not exceeding 60 N, validates the fixing.

2.132 Fixing for Colson collar – Ref. 319.59 or 318.99

- Function: holds and suspends cables and IRL tubes with the aid of Colson collars Ref. 318.70 / 71/ 72 and 319.10 / 13 / 16 / 19.
- Material: polyamide 6-6 according to ISO 1874, with neither halogen nor silicone.
- Colour: black, Ref. 319.59
  light grey, RAL 7035 Ref. 318.99.
- Marking: LEGRAND in relief.
- Overall dimensions: see drawings in Appendix.
- Non-flammability:
  test of the heating filament: 850°C / 30 s, according to NF EN 60-695,
  V2 according to UL 94.
- Use: inside ambience: Ref. 318.99
  outside ambience: Ref. 319.59
- Installation: T°C : -7°C / +49°C.
- Use: T°C: -25°C / +60°C.v
- Check *in situ*: extraction of the Pulsa 1000 E or Pulsa 700 E, with a force not exceeding 60 N, validates the fixing.

2.133 Collar with fitting for IRL tube, extra heavy Ref. 319.63 or 319.64

- Function: holds and suspends the IRL tubes, extra heavy.
- Material: polyamide 6-6 according to ISO 1874, with neither halogen nor silicone.
- Colour: black.
- Marking: LEGRAND in relief.
- Gripping capacity:
  Ref. 319.63, tube ∅ 16, ∅ 20 or ∅ 25
  Ref. 319.64, tube ∅ 25, ∅ 32 or ∅ 40
- Overall dimensions: see drawings in Appendix.
- Non-flammability
  test of the heating filament: 850°C / 30 s, according to NF EN 60-695,
  V2 according to UL 94.
- Use: inside and outside.
- Installation: T°C: -7°C / +49°C.
- Use: T°C: -25°C / +60°C.
- Check *in situ*: extraction of the Pulsa 1000 E or Pulsa 700 E, with a force not exceeding 85 N, validates the fixing.
- Impact strength: IK10 according to EN 50102.

2.134 SPIT CT-CLIP – Ref. 565508

- Function: holds and suspends rigid plastic tubes.
- Material: polyamide 6-6 according to ISO 1874.
- Colour: light grey, RAL 7035.
- Gripping capacity:
  Cables ∅ mini 16, ∅ maxi 32
  Tubes IRL ∅ 16, ∅ 20, ∅ 25, ∅ 32
- Overall dimensions: see drawings in Appendix.
- Non-flammability
  test of the heating filament: 630°C according to CEI 695-2-1/2.
- Installation: T°C: -5°C / +35°C.
- Use: T°C: -40°C / +70°C.

2.135 SPIT E-CLASP – Ref. 565502 / 565503 / 565504

- Function: holds and suspends plastic or metal tubes.
- Material: polyamide 6-6 according to ISO 1874.
- Colour: light grey, RAL 7035.

- Gripping capacity:
  Cables ∅ mini 16, ∅ maxi 25
  Tubes IRL ∅ 12, ∅ 16, ∅ 23
- Overall dimensions: see drawings in Appendix.
- Installation: T°C: -5°C / +40°C.
- Use: T°C: -30°C / +65°C.

2.136 SPIT E-CLIP – Ref. 565031 / 565032 / 565033 / 565034 / 565035 / 565036

- Function: holds and suspends rigid plastic tubes.
- Material: polypropylene.
- Colour: light grey, RAL 7035.
- Gripping capacity:
  Cables ∅ mini 16, ∅ maxi 50
  Tubes IRL ∅ 16, ∅ 20, ∅ 25, ∅ 32, ∅ 40, ∅ 50
- Overall dimensions: see drawings in Appendix.
- Non-flammability
  test of the heating filament: 630°C according to CEI 695-2-1/2.
- Installation: T°C: -5°C / +35°C.
- Use: T°C: -30°C / +55°C.

2.137 SPIT METAL HOOK – Ref. 037950 / 037970 / 037930 / 037940

- Function: holds and suspends rigid plastic tubes.
- Material: galvanised steel sheet.
- Colour: light grey, RAL 7035.
- Gripping capacity:
  Cables ∅ mini 16, ∅ maxi 32
  Tubes IRL ∅ 16, ∅ 20, ∅ 25, ∅ 32
- Overall dimensions: see drawings in Appendix.
- Installation: T°C: -5°C / +40°C.
- Use: T°C: -30°C / +65°C.

2.138 SPIT –CLIP Single and double – Ref. 037950 / 037970 / 037930 / 037940

- Function: holds and suspends plastic tubes, water pipes.
- Material: polypropylene.
- Colour: light grey, RAL 7035.
- Gripping capacity:
  Single P-CLIP: Cables ∅ mini 16, ∅ maxi 25
  Tubes IRL ∅ 16, ∅ 18, ∅ 20, ∅ 22, ∅ 25
  Double P-CLIP: Cables ∅ mini 16, ∅ maxi 22
  Tubes IRL ∅ 16, ∅ 18, ∅ 20, ∅ 22
- Overall dimensions: see drawings in Appendix.
- Non-flammability
  test of the heating filament: 650°C according to CEI 695-2-1/2.
- Installation: T°C: -5°C / +35°C.
- Use: T°C: -30°C / +60°C.

2.139 SPIT –CLIPELEC– Ref. 011203

- Function: holds and suspends electric cables and ducts.
- Material: copolymer polypropylene.
- Colour: black.
- Gripping capacity:
  depends on the gripping collar used
- Overall dimensions: see drawings in Appendix.
- Non-flammability:
  test of the heating filament: 750°C according to CEI 695-2-1/2.
- Installation: T°C: -5°C / +35°C.
- Use: T°C: -30°C / +55°C.

2.140 SPIT –Fixing rod, single and double Ref. 010060 (single) / 010061 (double)

- Function: holds and suspends electric cables and ducts.
- Material: copolymer polypropylene.
- Colour: grey.
- Gripping capacity:
  8 cables 3 x 1.5 (single versions)
  16 cables 3 x 1.5 (double version)
- Overall dimensions: see drawings in Appendix.
- Non-flammability:
  test of the heating filament: 650°C according to CEI 695-2-1/2.
- Installation: T°C: -5°C / +35°C.
- Use: T°C: -20°C / +70°C.

2.2 Substrate materials.

Concrete poured *in situ*, reinforced or not, honeycomb slab or underslab, pre-stressed or not, the characteristic strength of the concrete of which is equal to or greater than 20 MPa.

2.3 Installation tooling.

This tooling includes:

2.3.1 Nail driver

a) Trade designation:

- SPIT PULSA 1000 E or SPIT PULSA 700 E.

b) Technical characteristics:

- Portable nail driver, automatic resetting of piston and shock absorber.
- In compliance with the provisions of the "machines" Directive, as modified (Directive 89/392/EEC) and with the national legislations, affecting it.
- In conformity with the provisions of the following harmonised European Standards:

EN 292-1, EN 292-2	Machine safety
pr EN 792-13	Gas powered equipment
EN 50082-1, EN50082-2	Electromagnetic compatibility
EN 55011, EN 55014, EN 55104	Radioelectric disturbances

- Magazine of 40 studs for the Pulsa 1000 E and 20 studs for the Pulsa 700 E.
- Weight when empty: 3.9 kg Pulsa 1000 E,
  3.6 kg Pulsa 700 E.
- Overall dimensions

	PULSA 1000 E	PULSA 700 E
Length	295 mm	440 mm
Width	109 mm	109 mm
Height	383 mm	396 mm

- As part of their structure, the drivers have a heel that automatically positions the axis of the driver, perpendicular to the work surface.

2.32 Gas recharge

2.321 Technical characteristics

Aerosol generator in conformity with European Directive 75/324/EEC.

- Pulsa 700 E aerosol, capacity 30 ml
- Pulsa 1000 E aerosol, capacity 60 ml.

2.322 Packaging

- 1 Pulsa 700 E gas recharge per box of 500 studs.
- 2 Pulsa 1000 E gas recharges per box of 1500 studs.

3. Manufacture, Quality Assurance and Identification

3.1 Production centres

- Studs: SPIT SA, Marcerolles factory, F-26500 BOURG-LES-VALENCE
- Suspension elements: LEGRAND SA, factory at Fontaine le Bourg 76690 and ITW Construction products in Italy for the SPIT fixing accessories.

- Aerosol generator: manufactured in Switzerland for SPIT.
- Driver: SPIT SA, factory at Auréats, F-26000 VALENCE.

3.2 Quality Assurance Operations

All the components (stud, suspension element, aerosol generator, driver) are rigorously checked at every production step in compliance with the ISO 9002 Certification.

Moreover, the conformity of the production with the quality assurance reference documents is attested by product audits carried out by SOCOTEC as part of SPIT's membership in the SOCOTEC Quality Association.

3.3 Identification

The code and the traceability number of the studs or fixing elements appear on all the packings.

The traceability number of the aerosol generators appears on each generator.

The serial number of each driver is engraved on the plastic housing.

3.4 Trade designations

3.41 Studs C6/15, C6/20, SC6/15, SC6/20, HC6-17, HC6-22 and HC6-27

- C, SC, HC: stud reference
- 6: Ø of the head of the nail
- 15, 17, 20, 22 and 27: corresponds to the total length of the stud.

3.42 Suspension elements

- Collar with fitting, LEGRAND
  Ref. 319.00: light grey colour
  Ref. 319.02: black colour
  Capacity: from 1 to 12 cables, 3 x 1.5 mm²
- Fitting with collar, LEGRAND
  Ref. 318.99: grey colour
  Ref. 319.59: black colour
  Capacity: according to the length of the collars used (up to 70 cables, 3 x 1.5 mm² on the basis of a limit of 10 daN per fixing element).
- Collar with fitting for IRL tube, extra heavy
  Ref. 319.63: tube IRL 16, 20, 25
  Capacity: from 1 to 10 cables, 3 x 1.5 mm²
  Ref. 319.64: tube IRL 25, 32, 40
  Capacity: from 1 to 14 cables, 3 x 1.5 mm²
- SPIT elements according to reference to Paragraph 2.134 to 2.140 above.
- Accessories
  (Pliers for gripping and cutting the collars)

4. Installation

4.1 Use and servicing manual

In each driver's case there will be a use and servicing manual that each user should read before installation.

4.2 Installation

4.21 Adjusting the optimal penetration distance

To guarantee fixings of quality, a setting can be performed at the driver's finger gauge to control the penetration distance of the stud depending on the substrate material and upon the application (see page with drawings).

4.22 Preliminary validation test

The use in installation run of the system for fixing the suspension element by studs requires, after setting the penetration distance, a series of 12 shots, 10 of which must be satisfactory.

4.23 Installation guidelines (see sketch)

The Pulsa 1000 E and Pulsa 700 E drivers are directly usable for the suspension elements selected (no additional accessory is necessary).

1. The suspension element is clipped onto the Pulsa driver's stud guide.
2. Position the suspension element and the driver in the desired location on the substrate material.
3. Bring the driver perpendicularly into bearing on the substrate material and actuate the trigger.
4. Verification of the fixing *in situ*: this is done automatically when the driver is removed. Actually, this operation requires a force of 30 to 60 N maximum, which, in this way validates the fixing.

Note: It may happen that fixings fail. In such cases begin a fixing again, complying with the installation data set down in Paragraph 4.4.

4.3 Density of fixings

DTU 70.1[1], electrical installation, recommends fixing points close together. The distance between two fixing points shall not be greater than:

- In horizontal route:
  - 0.40 m for non-armoured cables,
  - 0.74 m for armoured cables.
- In vertical route, a value of 1 m.

The cables are fixed on either side of any direction change and immediately next to inlets into equipment.

4.4 Instructions concerning the fixings

The distances between the fixings, between each other and the extremities and the edges of the precast elements of the various floors are established as follows:

- 10 cm between them in every direction, including in the case of impenetrability;
- 60 cm from the extremities of pre-stressed honeycomb slabs, 30 cm from the extremities of pre-stressed underslabs, 10 cm from the edges in all the other cases.

The maximal penetration distance of a stud in the concrete the compressive strength of which is equal to or greater than 45 MPa (example case of honeycomb slabs or underslabs) is 15 mm.

B. Experimental results

Tests have been carried out by Société SPIT in its CEDRE laboratory, COFRAC accredited, TESTS no. 1-0239 for Programme 39-2. These tests relative to the system of driving nails for fixing elements by gas power are not part of this programme but the practices in terms of test quality have been the same.

The various test reports relative to:

- determination of the success rates,
- average penetration distance,
- the pull-out strength of the studs from various concretes, Classes C 20/25 to C 50/60 with or without cracks.
- pull-out strength of the suspension elements, collar with fitting and fitting with collar

  have been compiled in the Technical File that was submitted to CSTB.

These tests demonstrate that the average pull-out strength of the studs is greater than the strength of the suspension elements. Under conditions of installation in conformity with the manufacturer's instructions, the frequency measured of insertion failures is 12% in concrete C20 and 28% in concrete C50.

Tests were also carried out in the laboratory of CSTB's Structures Department:

1) Tests for crosschecking the determination of the rates of success and of the pull-out strength of the studs, and tests of shear strength of metal rails fixed with the studs: Test Report no. EM99062 - Part 1, dated May 22, 2000. These tests demonstrate that the average pull-out strength and shear strength of the studs is greater than the strength of the suspension elements.

2) Tests of nailing and of loading of fixing element inserted in underface of pre-stressed concrete honeycomb slab, submitted to bending along its two main axes:
Test Report no. EM99602 – Part 2, dated May 24, 2000.

C. References

STRUCTURE	LOCATION
EDF warehouses	Castelnau d'Estretefonds (31)

[1] DTU – Documents Techniques Unifiés (Unified Codes of Practice)

Hospital renovation	Rennes (35)
Tower PB 6	Paris La Défense (92)

Tables and figures of the Technical File

STUDS

15 mm for C6/15
SC6/15
20 mm for C6/20
SC6/20

Strip of 10 studs – Penetration limiters

LEGRAND SUSPENSION ELEMENTS

Collar with fitting Ref. 319.00 (light grey) or 319.02 (black)

Fitting for collar COLSON Ref. 319.59 (black) or 318.99 (light grey)

Collar with fitting for IRL tube Ref. 319.63 (tubes ∅16, ∅20 or ∅25)

Collar with fitting for IRL tube Ref. 319.64 (tubes ∅25, ∅32 or ∅40)

Studs HC6-17, HC6-22 and HC6-27

Strip of 10 studs –
Penetration limiters

SPIT GAS POWERED DRIVER

PULSA 1000 E **PULSA 700 E**

Bearing heel Bearing heel

Original stud guide with fixing verification system

Fixing on wall Fixing on floor Fixing on ceiling

The SPIT PULSA 1000E and PULSA 700 E drivers can fire in all positions

INSTALLATION GUIDELINES

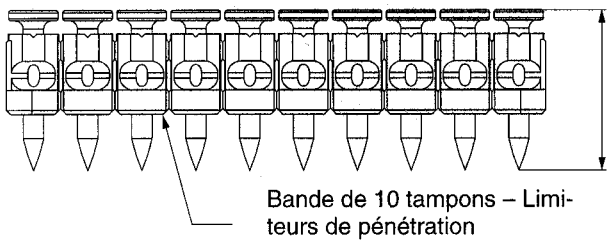
Collar with fitting Ref. 319.00 / 319.02

Fitting for collar COLSON Ref. 319.59 / 318.95

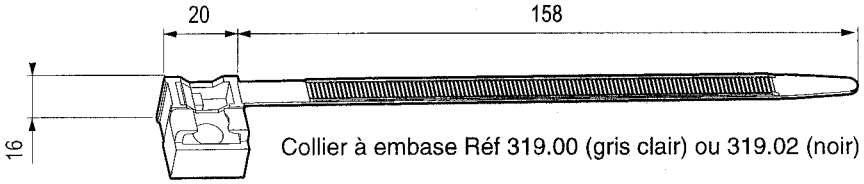
Collar with fitting for IRL tube Ref. 319.63 / 319.64

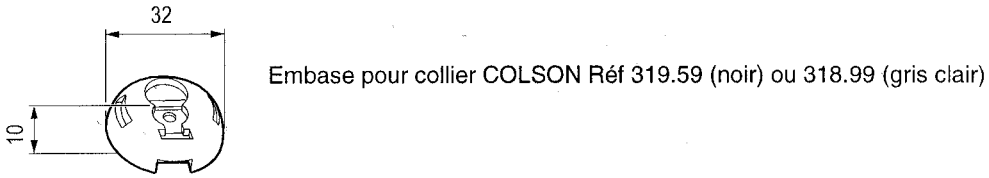
Tables and figures of the Technical File

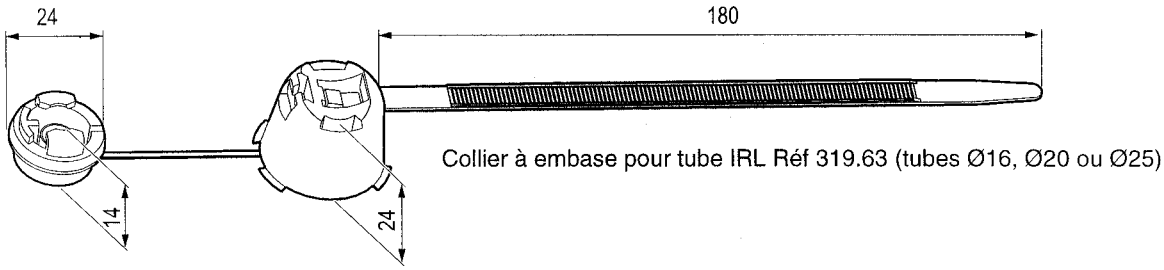
TAMPONS

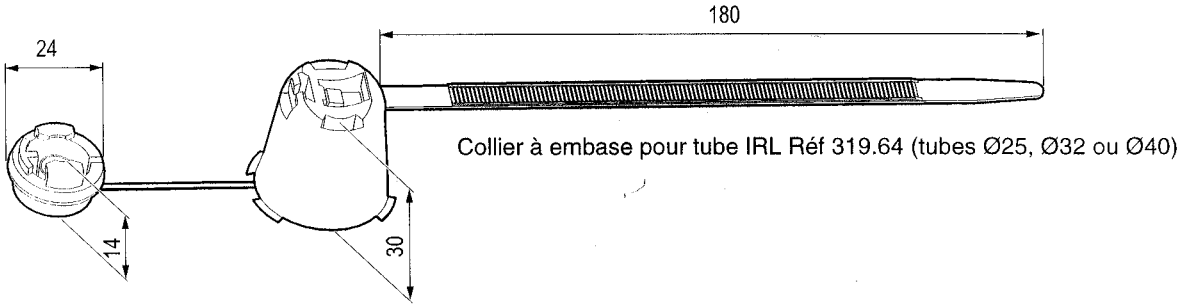


ELEMENTS DE SUSPENSION LEGRAND

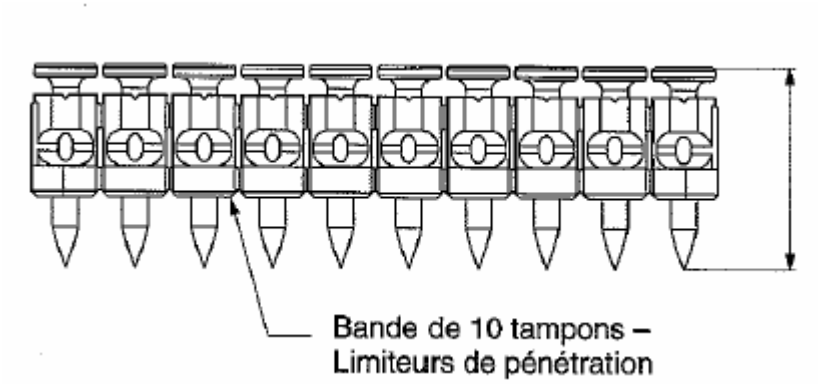




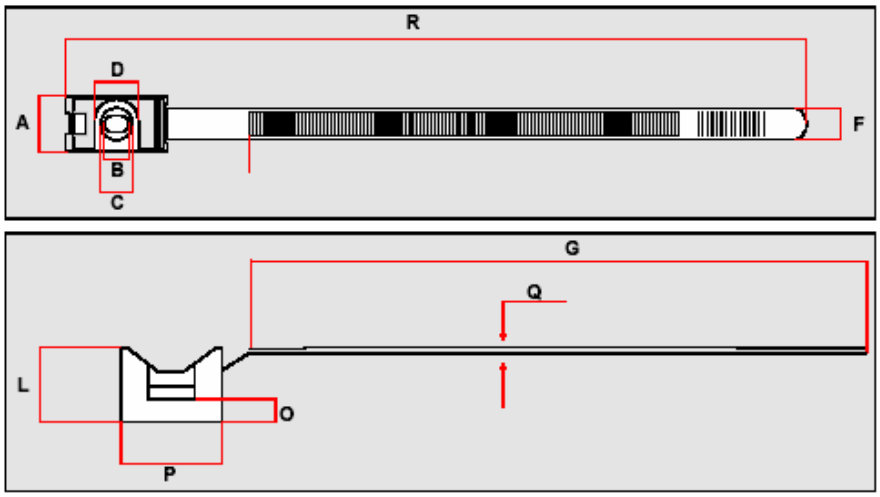




Studs HC6-17, HC6-22 and HC6-27

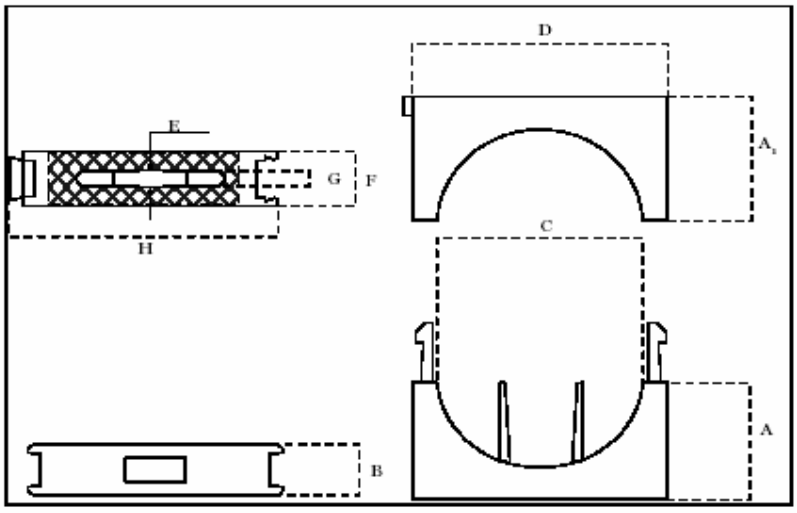


Suspension elements SPIT CT-CLIP (Ref. 565508)

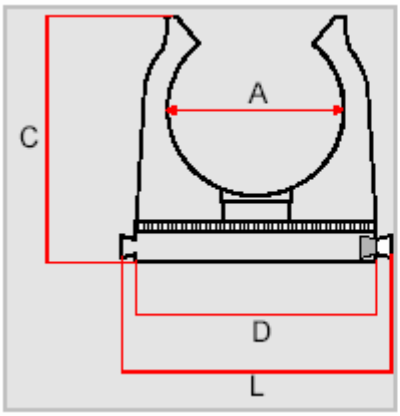


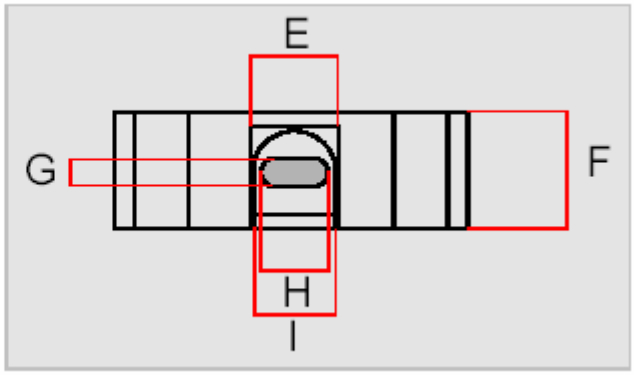
A	13,5
B	6
C	7,8
D	10,6
F	7,5
G	148
L	17,8
O	5,6
P	24,4
Q	1,5
R	180

Suspension elements SPIT E-CAV (Ref. 565502 / 565503 / 565504)



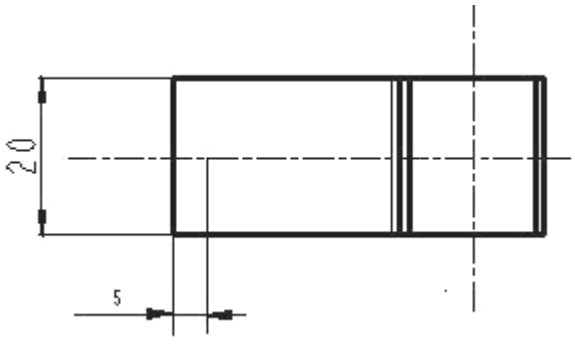
Suspension elements SPIT E-CLIP (Ref. 565031 / 565032 / 565033 / 562034 / 562035 / 562036)

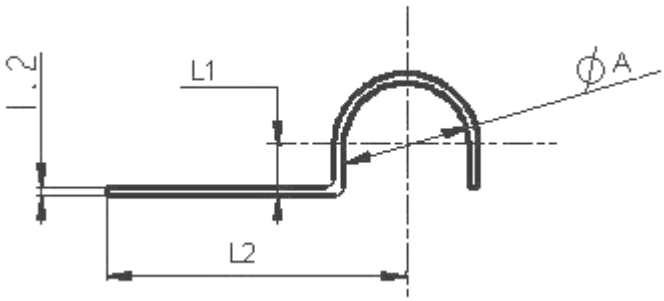




	Ø 16	Ø 20	Ø 25	Ø 32	Ø 40	Ø 50
A	14,7	18,6	23,5	30,5	38,1	48,5
C	26,9	29,3	35,5	43,5	49,7	58,5
D	22	28,1	34,2	41,2	48,1	59,2
F	16,1	16,1	16,1	16,1	16,1	16,1
G	4	4	4	4	4	4
H	9,1	9,1	9,1	9,1	9,1	9,1
I	10,4	10,9	11,1	10,7	10,4	10,4
L	27,1	32,8	39,1	46,2	53,1	64,4

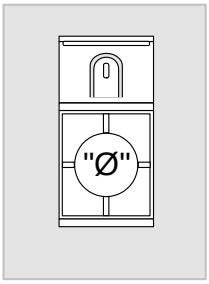
Suspension elements SPIT Hook, metal (Ref. 037950 / 037970 / 037930 / 037940)

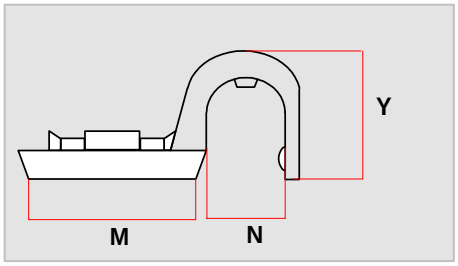


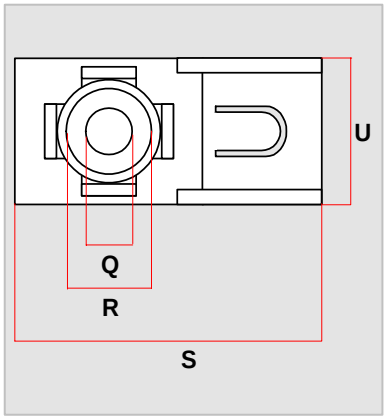


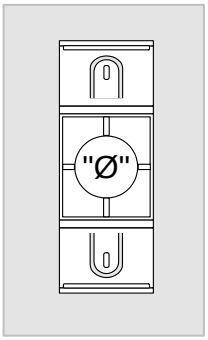
	ØA	L1	L2
Hook of 16	16	6.5	38
Hook of 25	25	11	42.5
Hook of 32	32	14	46

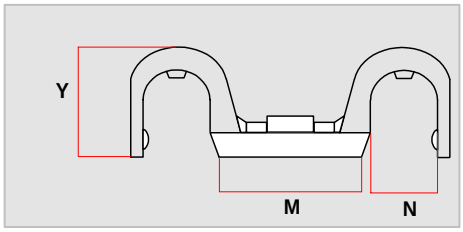
Suspension elements SPIT P-CLIP single and double (Ref. 565080 / 565082 / 565084 / 565085 / 565086)

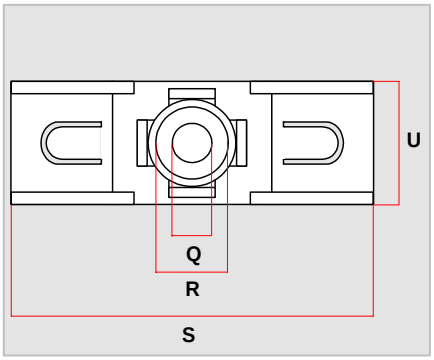






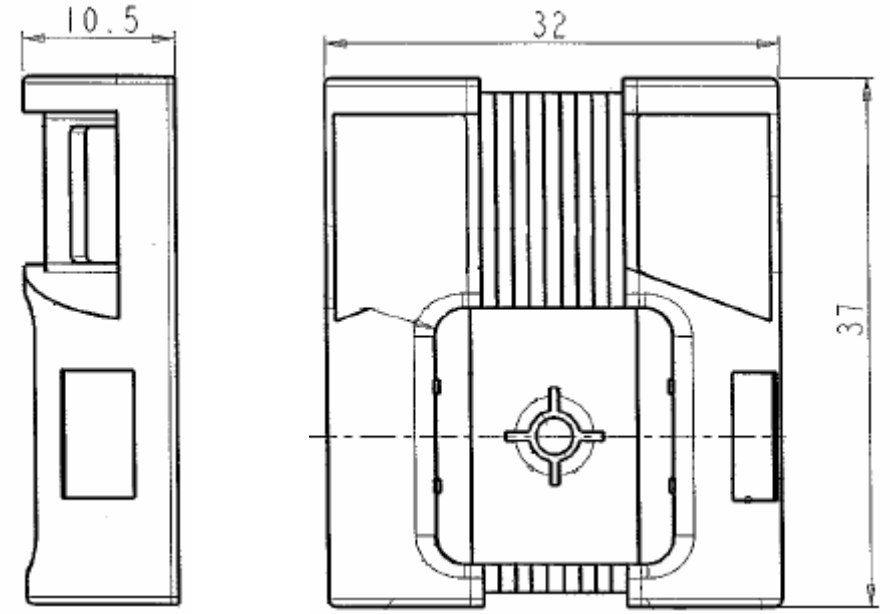


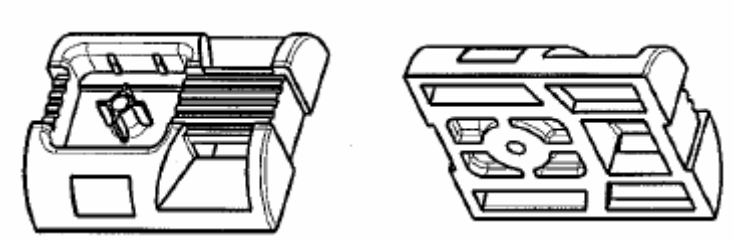




	Ø 16	Ø 18	Ø 20	Ø 22	Ø 25	Ø 16 x 16	Ø 20 x 20	Ø 22 x 22
M	28	28	28	28	28	28	28	28
N	16.2	18.5	20	21.6	24.7	16.2	20	21.6
Q	8	8	8	8	8	8	8	8
R	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
S	50	52.8	54	56.3	59.8	68.3	78.4	80.6
U	25	25	25	25	25	25	25	25
Y	20.5	22.6	25	27.3	30.6	20.5	25	27.3

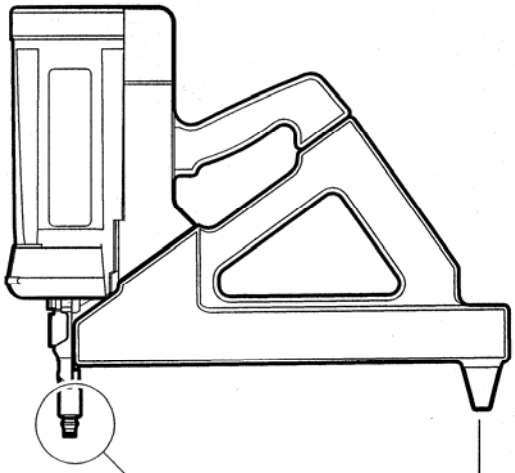
Suspension elements SPIT CLIPELEC (Ref.011203)





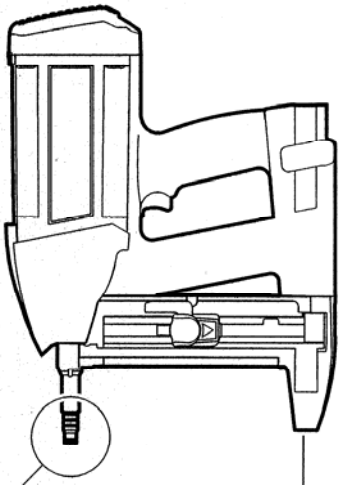
Elements, SPIT Rod, single and double fixing (Ref.010060 / 010061)

PULSA 1000 E

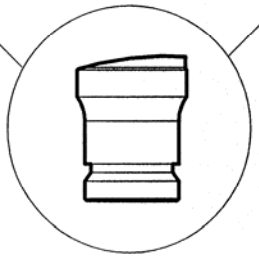


Talon de mise en appui

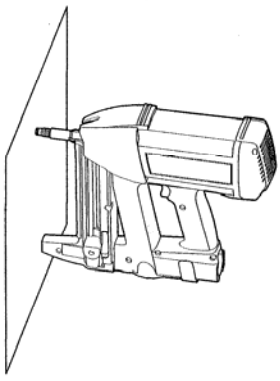
PULSA 700 E



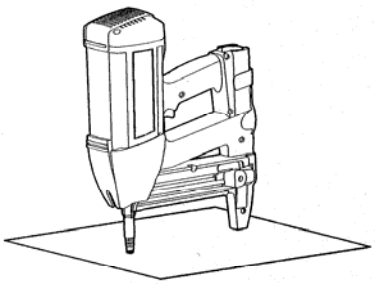
Talon de mise en appui



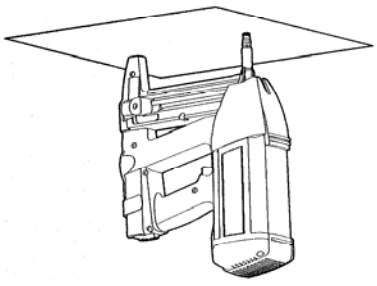
Guide tampon d'origine avec système de vérification de la fixation



Fixation au mur

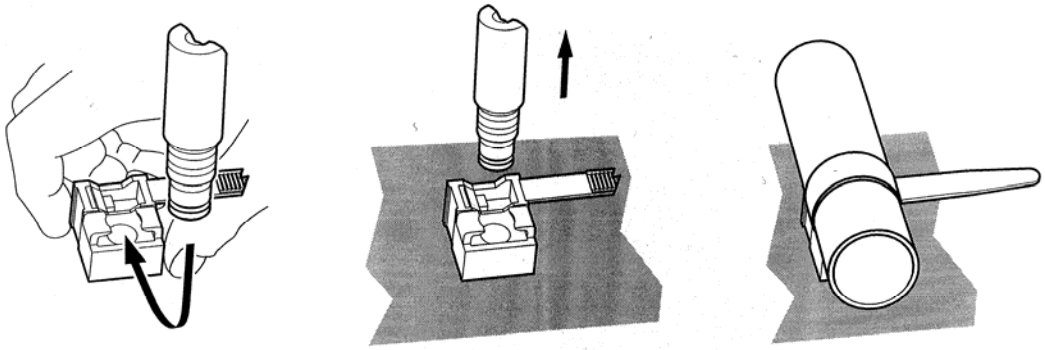


Fixation au sol

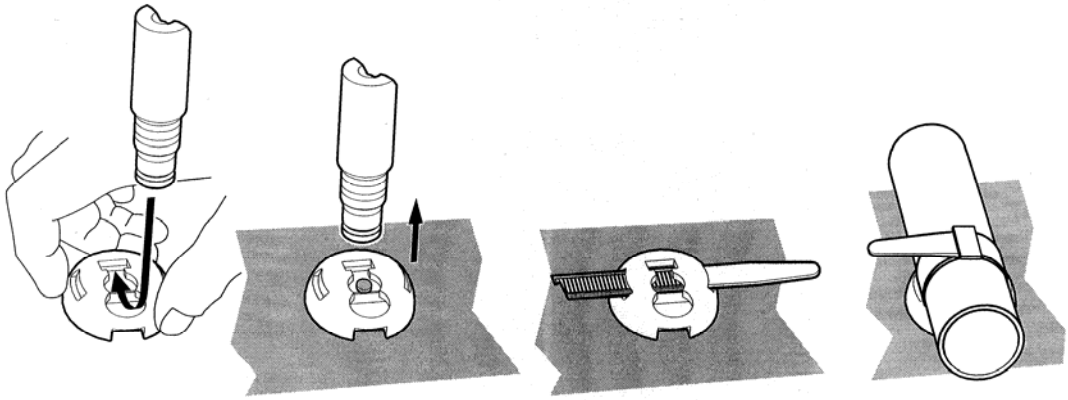


Fixation au plafond

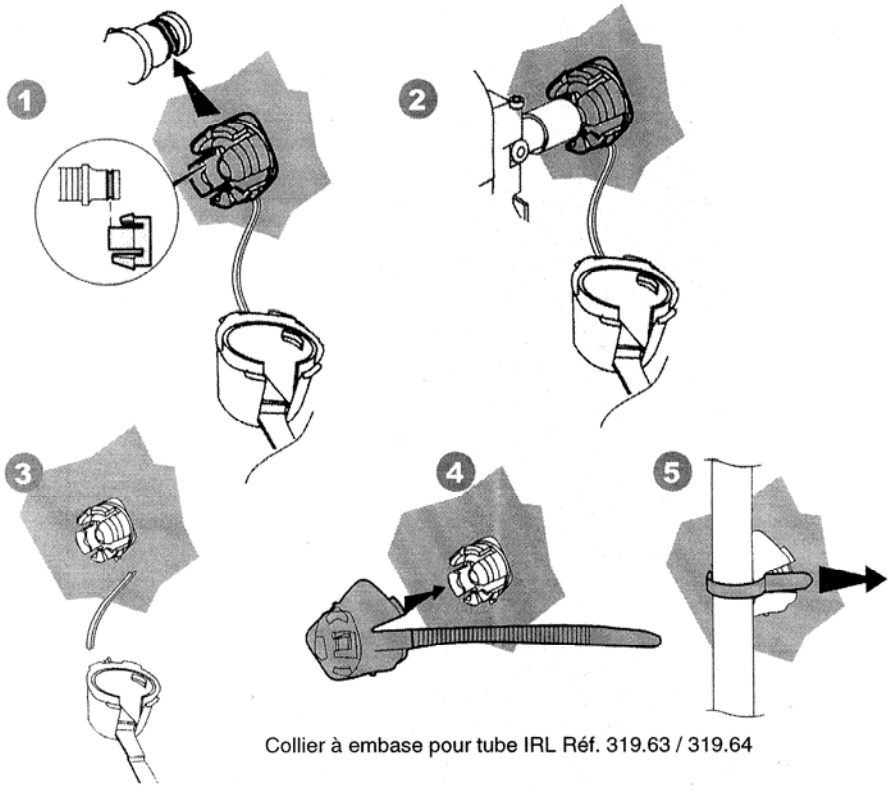
Les fixateurs SPIT PULSA 1000 E et PULSA 700 E peuvent tirer dans toutes les positions



Collier à embase Réf. 319.00 / 319.02



Embase pour collier COLSON Réf. 319.59 / 318.95



Collier à embase pour tube IRL Réf. 319.63 / 319.64