

AUTOMATIC WATER EXTINGUISHER AND ASSOCIATED FIRE PROTECTION INSTALLATION

DOMAIN OF THE INVENTION

5 The present invention relates to the field of fire protection installations.
The invention is based, in particular, on an automatic water extinguisher including at least one clamping collar, the diameter of which is adapted to several pipeline diameters.
The invention makes it possible, in particular to adapt *in situ* the extinguisher to several preexisting types of pipelines.

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PRIOR ART

Fires are one of the main causes of industrial accidents. Preventing fires is therefore a considerable challenge for companies and places receiving the public. Indeed, any incident linked to fire can cause considerable material and human damages. Companies are therefore
15 bound to implement measures aiming to prevent the risk of fire, any breach being able to lead to legal proceedings and penalties.

Conventionally, fire protection installations are equipment configured to detect, indicate and secure a given zone. To do this, a fire protection installation generally comprises members for detecting the presence of a fire, inhibition members configured to stop fire, alert members
20 configured to warn the presence of fire and a control station receiving information from detection members and triggering the inhibition and alert members in case of fire.

Among the different types of installations, fire protection installations using pressurised water conventionally comprise a pipeline network deployed within the zone to be protected. Pipelines comprise automatic water extinguishers, also known as "sprinklers", which more often ensure
25 both the inhibition function and the detection function. To do this, automatic water extinguishers comprise a base pierced with an opening, mounted on the pipeline. This opening is kept closed by a bulb or a fuse which is sensitive to temperature. In case of fire, the increase in temperature breaks the bulb or makes the fuse melt, which releases the pressurised water passage, which gushes out through the opening to spray the inflamed zone. In certain
30 embodiments, the water flow hits a deflector, positioned directly facing the opening of the automatic water extinguisher. This deflector makes it possible to expand and to orient the water flow in the direction of the inflamed zone.

There are also variants of this installation, wherein the extinguishers do not ensure the detection function, but only the spraying function. In this case, pipelines do not contain continuously

pressurised water, but the water is supplied to the extinguishers only when a fire has been detected moreover. In these embodiments, sprinklers do not comprise any bulb or fuse making it possible to block the passage of water.

To fix automatic water extinguishers on the pipelines, there is a first system consisting of welding a sleeve around an opening made in the pipeline. The automatic water extinguisher is then screwed on the sleeve. However, it is necessary to paint or galvanise the sleeve to give it the same colour as the rest of the pipeline, which can only be done after welding, and makes the process for manufacturing the installation more expensive.

To overcome these disadvantages, systems wherein the fixing of the sleeve onto the pipeline is no longer done by welding, but via a support collar have been developed.

According to a first example of an embodiment, the automatic water extinguisher is independent from the support collar. For example, document EP 0598151 describes a support collar comprising a connector making it possible to screw an automatic water extinguisher on the collar. To this end, the support collar comprises two parts. The first part, supporting the connector, is curved, to be adapted to the shape of the upper portion of a conduit. The second part is a part having a spring effect and making it possible to clip the support collar on the pipeline. In a variant, the second part can also be a curved, rigid part.

According to a second example of an embodiment, the automatic water extinguisher can be integral with the support collar. For example, document EP 3756733 describes a support collar comprising an upper part including the automatic water extinguisher and means for connecting with the lower part(s). The upper part is curved, in order to be adapted to the shape of the upper portion of a conduit. In a variant, the upper part can also be flat, such as illustrated in documents DE9106943 and GB8422476.

The lower part is a rigid, curved part, configured to be adapted to the shape of the lower and/or side portion of the conduit.

In any case, the curved shape of the first part and/or of the second part is such that it is impossible to adapt it for another pipeline diameter.

Indeed, there are no standards defining a standardised fire installation pipeline size on which the sprinklers are installed. The dimensions vary according to the needs and to the manufacturers. As an example, the pipelines found conventionally on the market have dimensions which vary in a range of standardised diameters of between 25 and 125mm, also called "DN 25" or "DN 125".

Thus, the systems proposed by the preceding documents require to know beforehand, the dimensions of the pipelines to be able to correctly choose the size of the support collars. This

system therefore has an adaptability defect which can cause additional costs and installation delays in the case where the dimensions of the collars are not adapted to the dimensions of the pipelines.

The technical problem that the invention proposes to resolve, is therefore to develop an automatic water extinguisher which could be adapted to several existing pipeline diameters.

DESCRIPTION OF THE INVENTION

To resolve this problem, the invention proposes to develop an automatic water extinguisher comprising at least one clamping collar made of a flexible material making it possible to adapt it to the shape and to the size of the pipeline. The invention is therefore the result of a discovery according to which these flexible clamping collar can be substituted for the rigid collars of the prior art without losing quality of installations.

Indeed, the fire protection installations are subjected to very constraining standards which require that the installations are compliant at the time of their commissioning, but also that they preserve this compliance all throughout their life, in order to be effective at the time of a fire. These standards regulate in particular the pressures at which the components of the installation must resist.

Yet, a person skilled in the art would be naturally led to think that the flexible clamping collars of the invention have a too-high risk of wear and of deformation, in particular when they are subjected to pressures of around 10 bars necessary in the fire installations, for example of between 5 and 20 bars and preferably between 8 and 12 bars. A person skilled in the art would thus have avoided using these clamping collars for the field of sprinklers in order to limit the safety risks.

Thus, the invention relates to an automatic water extinguisher intended to be mounted on an opening of a pipeline, said pipeline forming part of an installation configured to contain water pressurised from 5 to 20 bars, said extinguisher comprising:

- a one-piece base having a through-hole, and
- a seal intended to seal the connection between the opening of said pipeline and the through-hole of said base.

Such an extinguisher is characterised in that:

- the base further comprises at least two anchoring points, and
- the extinguisher comprises at least one clamping collar comprising:
 - an elongate element intended to partially surround the pipeline, said elongate element cooperating with the base at said anchoring points, and

- adjustment means independent of the base, making it possible to adapt the length of the at least one clamping collar so that the extinguisher is able to be mounted on pipelines of different diameters.

In other words, the adjustment means make it possible to adapt the length of the clamping collar with respect to the diameter of the pipeline. For example, the collar can have a sufficient length to be adapted to diameters of between 25 and 50mm.

To obtain this adaptation capacity, the adjustment means can be presented in the form of a loop, cooperating with notches made in the elongate element.

The adjustment means are further independent of the base, in order to be positioned in a distant zone of the base and thus be able to best resist the pressure constraints being exerted on the opening of the pipeline. Indeed, the more the adjustment means are distant from the base, the better the clamping collar resists extension, deformation and breaking.

Preferably, the adjustment means are installed diametrically opposite the opening of the pipeline, to best compensate for the pressure force being exerted on the base, from the opening of the pipeline. The tension being exerted around the pipeline, it is thus better distributed.

According to the invention, the base is one-piece, i.e. that the base is a part formed of one single holding, opposed to a part coming from the assembly of several constitutive elements, such as described, for example, in document WO2018/014066. Given the high pressures exerted, the use of a one-piece base makes it possible to guarantee a long-lasting resistance for a guarantee duration of operation, for example for 5 or 10 years of operation.

The association of the seal, the adjustment means and the elongate element cooperating with the base, makes it possible to guarantee the sealing of the connection between the pipeline and the automatic extinguisher, as well as the adaptability of the clamping collar to different pipeline diameters. Indeed, the elongate element makes it possible to press the base against the pipeline, while the seal, interposed between the base and the pipeline is compressed. Under the traction of the elongate element on the base, the seal is deformed to guarantee the sealing of the base around the through-hole of the pipeline and to follow the curvature of the pipeline. Thus, the seal under the pressure of the base makes it possible to absorb the differences of curvatures between the pipeline and the base. Furthermore, the adjustment means make it possible to secure the elongate element in a position, wherein the seal is compressed, so that the compression capacity of the seal also fills the lack of progressiveness of the fixing positions of the clamping means.

It ensues that the traction exerted by the elongate element on the base, the modularity of the adjustment means and the deformation capacity of the seal make it possible to adapt the support device to pipelines of variable diameters.

Moreover, the adjustment means and the elongate element are durable over time, i.e. that they do not deform and do not malfunction over time. The connection therefore remains durably sealed.

Furthermore, the association of the adjustment means and of the seal also makes it possible to adapt the length of the clamping collar to very low variations of the diameter of the pipeline, due to manufacturing tolerances. Indeed, among the pipelines of a given diameter, for example for a diameter of 25mm, the tolerance of the manufacturer can provide a margin of +/- 1mm within which the diameter of the pipeline can vary. Preferably, the notches of the adjustment means have a sufficiently reduced pitch to enable the adaptation to the tolerance of the manufacturer.

The automatic water extinguisher can be positioned with any orientation with respect to the pipeline, as long as it is fixed to an opening of the pipeline. As an example, the automatic water extinguisher can be positioned above the pipeline, below or on the side.

The length of the clamping collars corresponds to the useful portion of the collars, which is intended to be positioned against the walls of the pipeline. Indeed, a clamping collar can have a fixed total length, but during the adjustment, only one portion of the collar can be used effectively to hold the automatic water extinguisher against the pipeline. The useless portion can optionally be cut to not impede the extinguishing generated by the automatic extinguisher. Advantageously, such an automatic water extinguisher makes it possible to make the installation more compact. Indeed, the invention makes it possible to do without the presence of a sleeve for receiving the automatic extinguisher. This configuration therefore makes it possible to reduce the height of the automatic water extinguisher. This can therefore be more easily inserted in reduced spaces, such as storage racks, or spaces under a low ceiling, for example.

Furthermore, clamping collars being able to adapt to several pipeline diameters make it possible to limit the number of different collar size references, which limits the production costs. Moreover, the adjustment of the clamping collars can be done substantially continuously, contrary to the support collars of the prior art, which have a shape adapted to one single pipeline diameter.

In addition, the clamping collars of the invention make it possible to adapt the automatic water extinguisher *in situ*, without having to provide the number and the size of the collars beforehand. This enables significant time savings and a significant decrease of the cost price.

In an embodiment, the extinguisher comprises one single clamping collar and only two
5 anchoring points disposed either side of the base.

Indeed, a person skilled in the art thinking that the flexible clamping collars of the invention have a too-high risk of wear and of deformation, would be led to multiply the number of clamping collars to reinforce the structure of the clamping collar. Yet, the invention makes it possible, against all expectations, to only use one single clamping collar without increasing the
10 risks of leakages, for example.

In the sense of the invention, the "anchoring points" correspond to the receiving elements of the base, making it possible to fix the clamping collar when the clamping collar is enclosed around the pipeline. These anchoring points can correspond to openings or excrescences, such as lugs.

15 According to an embodiment, the anchoring points are through openings oriented in a direction parallel to the main direction of the pipeline, the elongate element being mounted on the base by inserting at least one end of the elongate element in the through openings and by forming a loop around the borders of said base.

According to the invention, the main direction of the pipeline corresponds to the direction
20 parallel to the length of the pipeline.

The mounting of the clamping collar on the base is thus facilitated, as the adjustment method is easily reproducible and requires few tools. As an example, it suffices to pass through the two openings from bottom to top, so that the elongate element surrounds the pipeline. The ends of the elongate element are then pulled from the top of the base and folded above the ends of the
25 base to clamp the clamping collar around the pipeline. The ends of the elongate element are then returned together and fixed by the adjustment means. The installation of the automatic water extinguishers on the pipelines is thus mainly made quicker.

In practice, the through openings can correspond to slots made in the base. In a variant, the through openings can correspond to the space formed between the base and an axis mounted
30 on the base.

Preferably, the openings are made symmetrically with respect to a central axis of the base, thus making it possible to reduce the risks of incorrect positioning of the automatic water extinguisher against the opening of the pipeline.

According to another embodiment, the two ends of the elongate element are configured to cooperate with the anchoring points disposed either side of the base, so that the elongate element partially surrounds the pipeline after action on the adjustment means.

In practice, each anchoring point comprises a housing delimited by two lugs, separated by a slot sized to enable the passage of the elongate element, the housing being intended to receive an axis fixed to an end of the elongate element, the lugs being intended to enable the insertion of the axes in the housings before action on the adjustment means and to block the extraction of said axes after action on the adjustment means.

The mounting of the clamping collar on the base is thus facilitated as the adjustment method is easily reproducible and requires few tools. It suffices that the elongate element surrounds the pipeline and that its ends, provided with an axis, are blocked in the housings of the base. The clamping collar is then adapted to the diameter of the pipeline via the adjustment means. The installation of the automatic water extinguishers on the pipelines is thus mainly made quicker. In a variant, each anchoring point comprises a lug intended to cooperate with a hole made at the ends of the elongate element.

The mounting of the clamping collar on the base is done by mounting the elongate element around the pipeline so that its ends, provided with a hole, are blocked on the lugs of the base. The clamping collar is then adapted to the diameter of the pipeline via the adjustment means. The elongate element can take different forms. In a first form, the elongate element is a strip, i.e. of form similar to a band. In a variant, the elongate element is a cable, thinner but however just as resistant. Indeed, the invention makes it possible to use elongate elements, the width of which is reduced without compromising the safety of the installations.

In practice, the elongate element is formed in a metal material, as surprisingly, the invention makes it possible to use different materials to produce the elongate element without compromising the safety of the installations.

Advantageously, the means for adjusting the length of the at least one clamping collar comprise markers making it possible to compress the seal at a predetermined rate.

This embodiment makes it possible to facilitate the installation of the clamping collar and to remove risks of errors. The technician can indeed rely on visual markers during the installation, indicating them how far to clamp the clamping collar so that the seal is optimally compressed to not create leakages according to the diameter and to the service pressure. In a variant, these adjustment markers can also be replaced by or associated with an appliance for measuring the adjustment tension of the clamping collar.

Furthermore, in a preferable embodiment, the adjustment means are integral with an end of the elongate element.

Indeed, this embodiment makes it possible to achieve the clamping of the automatic extinguisher on the pipeline by performing a simple movement of pulling the free end of the

5 elongate element.

A clamping collar having the preceding features makes it possible to advantageously simplify and reduce the time necessary for the mounting of the automatic water extinguisher on the pipeline.

10 However, the system for blocking the elongate element could be different, without this damaging the correct operation of the invention.

In certain embodiments of the invention, the automatic water extinguisher further comprises an element for blocking said through-hole sensitive to temperature and configured to release the through-hole when the temperature exceeds a threshold value so as to extract a water flow from the pipeline.

15 Advantageously, the automatic water extinguisher also comprises a deflector fixed above said base and intended to spray the water flow coming from the pipeline.

These elements form the head of the automatic water extinguisher. The invention covers the embodiments wherein the stirrups and the base form a monolithic block, on which a deflector and a blocking element will be mounted. Alternatively, the invention also covers the
20 embodiments, wherein the head, formed by the stirrups, the deflector and the blocking element, is independent of the base.

In other words, according to a first embodiment, the base and the head, comprising the deflector, the stirrups and/or the blocking element form a monolithic block.

According to a second embodiment, the base and the head, comprising the deflector, the stirrups
25 and/or the blocking element are independent, the head being mounted on the base by screwing, by interlocking in a grooved connector or by any other cooperation means.

According to another aspect, the invention relates to a fire protection installation including:

- at least one pipeline having at least one opening, and
- at least one automatic water extinguisher such as described above.

30 Preferably, the pipeline is a pipeline, painted or pre-painted on its internal and external faces, i.e. that the pipeline comprises a painting covering its internal and external faces. The painting makes it possible to protect the pipeline from degradations, in particular those caused by rust.

The painting applied must make it possible to make piercings and cuttings without flaking, thus reducing considerably the manufacturing time in the workshop. Indeed, the painting phase after manufacturing usually done in the known methods is removed.

Preferably, the painting of the pipeline comprises an epoxide polymer binder, particularly
5 resistant during piercing and cutting.

BRIEF DESCRIPTION OF THE FIGURES

The way in which to achieve the invention, as well as the advantages which arise from this, will emerge from the description of the embodiments below, in support of the accompanying
10 figures, wherein:

Figure 1 is a perspective view of a pipeline on which four automatic water extinguishers according to four different embodiments are fixed,

Figure 2 is a perspective view of a pipeline on which four automatic water extinguishers according to another four different embodiments are fixed,

15 Figure 3 is a front view of an automatic water extinguisher mounted on a pipeline according to a first embodiment of figure 1,

Figure 4 is a side view of an automatic water extinguisher mounted on a pipeline according to the first embodiment of figure 1,

20 Figure 5 is a top view of an automatic water extinguisher mounted on a pipeline according to the first embodiment of figure 1,

Figure 6 is a front view of an automatic water extinguisher mounted on a pipeline according to a second embodiment of figure 1,

Figure 7 is a side view of an automatic water extinguisher mounted on a pipeline according to the second embodiment of figure 1,

25 Figure 8 is a top view of an automatic water extinguisher mounted on a pipeline according to the second embodiment of figure 1,

Figure 9 is a front view of an automatic water extinguisher mounted on a pipeline according to a third embodiment of figure 1,

30 Figure 10 is a side view of an automatic water extinguisher mounted on a pipeline according to the third embodiment of figure 1,

Figure 11 is a top view of an automatic water extinguisher mounted on a pipeline according to the third embodiment of figure 1,

Figure 12 is a front view of an automatic water extinguisher mounted on a pipeline according to a fourth embodiment of figure 1,

Figure 13 is a side view of an automatic water extinguisher mounted on a pipeline according to the fourth embodiment of figure 1,

Figure 14 is a top view of an automatic water extinguisher mounted on a pipeline according to the fourth embodiment of figure 1,

5 Figure 15 is a front view of an automatic water extinguisher mounted on a pipeline according to a fifth embodiment of figure 2,

Figure 16 is a side view of an automatic water extinguisher mounted on a pipeline according to the fifth embodiment of figure 2,

10 Figure 17 is a top view of an automatic water extinguisher mounted on a pipeline according to the fifth embodiment of figure 2,

Figure 18 is a front view of an automatic water extinguisher mounted on a pipeline according to a sixth embodiment of figure 2,

Figure 19 is a side view of an automatic water extinguisher mounted on a pipeline according to the sixth embodiment of figure 2,

15 Figure 20 is a top view of an automatic water extinguisher mounted on a pipeline according to the sixth embodiment of figure 2,

Figure 21 is a front view of an automatic water extinguisher mounted on a pipeline according to a seventh embodiment of figure 2,

20 Figure 22 is a side view of an automatic water extinguisher mounted on a pipeline according to the seventh embodiment of figure 2,

Figure 23 is a top view of an automatic water extinguisher mounted on a pipeline according to the seventh embodiment of figure 2,

Figure 24 is a front view of an automatic water extinguisher mounted on a pipeline according to an eighth embodiment of figure 2,

25 Figure 25 is a side view of an automatic water extinguisher mounted on a pipeline according to the eighth embodiment of figure 2,

Figure 26 is a top view of an automatic water extinguisher mounted on a pipeline according to the eighth embodiment of figure 2,

30 Figure 27 is a perspective view of the base of an automatic water extinguisher mounted on a pipeline and of the clamping collar according to a ninth embodiment of the invention,

Figure 28 is a perspective view of the adjustment means of the clamping collar of figure 27,

Figure 29 is a partial cross-sectional view of the means for adjusting the clamping collar of figure 27,

Figure 30a is a cross-sectional view of a first step of installing an automatic water extinguisher according to a tenth embodiment of the invention,

Figure 30b is a cross-sectional view of a second step of installing an automatic water extinguisher according to a tenth embodiment of the invention,

5 Figure 30c is a cross-sectional view of a third step of installing an automatic water extinguisher according to a tenth embodiment of the invention,

Figure 30d is a cross-sectional view of a fourth step of installing an automatic water extinguisher according to a tenth embodiment of the invention,

Figure 31 is a high-angle perspective view of the base of an automatic water extinguisher
10 according to an eleventh embodiment of the invention,

Figure 32 is a front view of the base of the automatic water extinguisher of figure 31, and

Figure 33 is a low-angle perspective view of the base of the automatic water extinguisher of figure 31.

15 DESCRIPTION OF THE EMBODIMENTS

Such as illustrated in figures 1 and 2, automatic water extinguishers **100, 200, 300, 400, 800, 900, 1000, 1100** are mounted on a fire protection installation comprising at least one pipeline **40**.

The pipeline **40** is configured to support pressures of around ten bars, for example of between
20 5 and 20 bars and preferably between 8 and 12 bars. To do this, the pipeline **40** is preferably made of a material having good deformation-resistant properties, typically made of steel, stainless steel, galvanised steel, copper or chlorinated polyvinyl chloride.

Furthermore, the diameter of the pipeline **40** can vary, typically between 25 and 125mm, also called "DN 25" or "DN 125", according to the needs linked to the zone to be protected,
25 dimensions of the installation and of the positioning of the automatic extinguisher with respect to the water source.

As an example, the fire protection installation can be formed of a central pipeline skeleton **40** of a greater dimension and of ramifications formed by pipelines of a smaller diameter.

In order to integrate the automatic water extinguishers **100, 200, 300, 400, 800, 900, 1000, 1100**
30 of the invention, one or more openings **42** are made in the pipelines **40**. The openings **42** are, for example, circular in top view, of a diameter of between 10 and 25mm, also called "DN 10", or "DN 25". The diameter of the opening **42** is sized according to the sprinkler head which will be chosen for the extinguishing of the zone to be protected. Furthermore, it has also been observed that the invention can also be implemented for pipelines of DN 32 to DN 40.

The distance separating two openings **42** is adjusted generally between 2 and 4.6m. Likewise, an opening **42** must be distant by at least 1m from a wall of the zone to be protected. It has been recently observed that the distance separating two openings **42** can be 0.9m.

Figures 1 and 2 illustrate several embodiments of automatic water extinguishers **100, 200, 300, 400, 800, 900, 1000, 1100** according to the invention. All the embodiments however have common elements. As an example, in reference to figures 3 to 5, the automatic water extinguishers **100, 200, 300, 400, 800, 900, 1000, 1100** are formed of a one-piece base **24A-24D, 2AH-24K** having a flat, substantially parallelepiped shape of a thickness of between 0.5 and 1.5cm. In a variant, the lower face of the base **24E, 24G** can have a slight curvature, such as illustrated in figure 27 and 31-33. The curvature of the lower face is chosen to be adapted to the curvature of the pipeline **40** of a greater diameter on which the automatic water extinguisher **500, 700** can be adapted. More recently, bases **24E, 24G** having a thickness of 3mm have been observed.

The base **24A-24D, 2AH-24K** can be directly obtained by a moulding method, a method by subtracting material such as machining or laser cutting, or also by an additive method, such as 3D printing.

The base **24A-24K** further has, for example, a through-opening **26** of a diameter of between 2 and 10mm. The diameter can be greater, without changing the invention, typically of between 10 and 500mm.

Advantageously, a seal **28** is positioned facing the lower face of the base **24A-24K**, typically between the base **24A-24K** and the pipeline **40**, so as to surround the openings **26** and **42** respectively of the base **24A-24 K** and of the pipeline **40**. As an example, the seal **28** is a rubber O-ring of a thickness of between 0.2 and 0.7cm. In a variant, for the pipelines of a greater diameter, the seal can comprise lips and have a thickness of between 0.5 and 3cm.

The opening **26** of the base **24A-24 K** is preferably blocked by a heat-sensitive blocking element **23**, typically a glass bulb or a fuse configured to degrade when the temperature in the proximity of the automatic water extinguishers **100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100** reaches a triggering threshold value, typically of between 57 and 343°C.

There are several temperature standards for degrading the bulbs and/or fuses. These standards are, in particular, recognisable to the colour of the liquid contained in the bulb. As an example, the red colour corresponds to a triggering temperature of 68°C.

Advantageously, a deflector **22** is positioned facing the opening **26** of the base **24A-24D, 24H-24K**. The deflector **22** has a shape similar to an umbrella or a parasol, i.e. a circular surface, preferably curved, the concave part of which is positioned facing the opening **26** so as to

intercept a water flow coming from the opening **26** and to redirect it to the inflamed zone. In a variant, the deflector **22** can have any other shape enabling an effective dispersion of the water flow.

Advantageously, the perimeter of the deflector is provided with fins **21**. The deflector **22** is held by side stirrups **29**, advantageously two of them. The assembly is, for example, made of brass, bronze, aluminium, stainless steel, titanium or copper. A screw is, for example, fixed at the junction between the stirrups **29** and the deflector. The screw makes it possible to both hold the deflector and press on the blocking element **23**.

According to the embodiments illustrated in figures 1 to 26, the assembly formed by the deflector **22**, the stirrups **29** and the blocking element **23**, also called "head" **20**, is integral with the base **24A-24D, 24H-24K**.

In other embodiments, illustrated for example in figure 27 and 31 to 33, the head **20**, not represented, can be independent of the base **24E, 24G**, i.e. that the head **20** can be mounted on the base **24E, 24G** by aligning the through-opening of the head **20** with the through-opening **26** of the base **24E, 24G**. For example, the head **20** can have a male portion having a thread or a groove and cooperating with a second thread or a groove made in the walls of the through-opening **26** of the base **24E, 24G**. The head **20** can thus be screwed or fixed by way of a grooved connector on the base **24E, 24G**.

The clamping collar(s) **30** make(s) it possible to fix and hold the head **20** on the pipeline **40**.

The clamping collars **30** comprise an elongate element, like for example a strip of a width of between 0.5 and 2cm, or also a cable of diameter of between 0.2 and 1cm. In a variant, the elongate element can be a "serflex"-type clamping element, made of a metal material. The clamping collars **30** also comprise adjustment means **32** of the length and the clamping of a clamping collar **30**. The base **24A-24K** can be provided with one or more clamping collars **30** according to the needs of the installation and of the diameter of the pipeline **40**.

The adjustment means **32** are independent of the base **24A-24K**.

According to a first example, the adjustment means **32** can also be independent of the elongate element of the clamping collar **30**. They can be constituted of one or more mounted parts which can be fixed or interlocked on the elongate element in order to hold it in place.

Such as illustrated in figures 27 to 29, the clamping collar **30** can be presented in the form of a metal strip **31** and the adjustment means can include a loop **33A**, independent of the strip **31**, comprising a housing **35** wherein the ends of the strip **31** are inserted. Self-tapping screws **34** make it possible to pierce the different strip **31** thicknesses. Advantageously, the loop **33A** has an opening **36** making it possible to receive the lower portion of the body of the screw **34**.

Thus, the elongate element can be directly adapted to the diameter and to the tolerance of a pipeline **40** by creating the opening necessary so that the seal **28** is compressed with an optimal compression rate and that the connection between the pipeline and the automatic extinguisher is made as sealed as possible. The adjustment is done "bespoke", and the adjustment options are almost continuous.

In a variant, in an embodiment not represented in the figures, the elongate element can be a metal strip comprising openings made regularly and closely along the elongate element. So that the elongate element can be directly adapted to the diameter and to the tolerance of a pipeline, the pitch between the openings is preferably less than or equal to the tolerance of the manufacturer. Typically, if the pipeline has a diameter of 25mm and that the tolerance is +/- 1mm, the pitch between the openings is less than or equal to 1mm. Thus, the seal can be compressed with an optimal compression rate, and the connection between the pipeline and the automatic extinguisher is made as sealed as possible.

In order to fix the base **24E** on the pipeline **40**, this is positioned on the opening **42** of the pipeline **40**, so that the stirrups of the head are aligned with the length of the pipeline **40** so that water gushes out in a direction perpendicular to the main direction **D** of the pipeline **40**. The two ends of the strip **31** are inserted, in a bottom to top movement, through the anchoring points, materialised by side openings **25E** so that the strip **31** surrounds the pipeline **40**. The ends of the strip **31** are then pulled from the top of the base **24E** and folded above the ends of the base **24E** to clamp the clamping collar **30** around the pipeline **40**. The ends of the strip **31** are then returned together, thus forming a loop around each edge of the base **24E**. The ends of the strip **31** are then fixed together by the adjustment means **32**.

Thus, such as illustrated in figure 29, the loop **33A** is positioned on a first strip **31** thickness. The ends of the strip **31** are then folded and inserted in the housing **35** of the loop **33A**, then clamped so as to effectively hold the base **24E** on the pipeline **40**. To do this, the ends of the strip **31** go past each side of the housing **35** over a length of at least 1cm. The ends of the strip **31** are thus superposed at the body **37** of the loop **33A**. The screw **34** is finally inserted at this superposition and pierces the two thicknesses formed by the ends of the strip **31**.

In a variant, such as illustrated in figures 30a to 30d, the adjustment means **32** can be integral with an end of the strip. Thus, the clamping collar **30** can be presented in the form of a metal strip **31** and the adjustment means can include a loop **33B** comprising a housing **35**, fixed to the end of the strip **31**.

The housing **35** can take the form of a tube of parallelepiped cross-section, intended to enable the passage of a part of the metal strip **31**. Furthermore, the fixing means, such as a self-tapping

screw **34**, can be placed on the housing **35**, perpendicularly to the length of the tube and in the movement direction of the strip **31** in the tube, so as to restrain the movements of the strip **31** when it is compressed around the pipeline **40** and inserted in the tube.

In an alternative embodiment not represented, the fixing means include a ball contained in the tube and intended to block the movements of the elongate element. To do this, the tube has a variable cross-section. Typically, the cross-section of the tube is narrowed from the dimensions greater than the diameter of the ball up to dimensions substantially equal to the diameter of the ball. Thus, during the sliding of the elongate element in the tube, the ball is driven in a direction opposite the insertion direction of the elongate element, towards the part of the tube of reduced dimensions, where it gets blocked. The ball thus also blocks the elongate element.

In the embodiment of figures 30a-30d, the spaces **25F** of the base **24F** are used to create fixing points of the strip **31**. To do this, such as illustrated in figure 30a, the end of the strip **31** not provided with the loop **33B** is inserted in a first movement **M1** to surround a first fixing point of the base **24F**. This movement **M1** is performed by inserting the strip **31** in the space **25F** from the upper face of the base **24F** up to the lower face of the base **24F** until the strip **31** arrives along the pipeline **40**.

The strip **31** is thus moved around the pipeline **40** up to the second fixing point of the base **24F**. Such as illustrated in figure 30b, the strip **31** is thus introduced in the space **25F** according to the movement **M2** to surround the second fixing point of the base **24F**. This movement **M2** is performed by inserting the strip **31** in the space **25F** from the lower face of the base **24F** up to the upper face of the base **24F** until the strip **31** arrives along the pipeline **40**.

The strip **31** is thus introduced in the loop **33B** according to the movement **M3**, illustrated in figure 30c. The clamping collar **30** is then compressed around the pipeline **40** by pulling on the end of the strip **33** after its passage into the housing of the loop **33B**, according to the movement **M4**.

In certain embodiments, when the sought compression tension of the strip **31** is obtained, means for fixing the strip **31** in the housing can be inserted in the loop **33C** by means of an action in a direction **M5**, perpendicular to the length of the housing **35**, such as illustrated in figure 30d. Subsequently, the remaining end of the strip **31** going past the loop **33C** can optionally be split. Furthermore, the strip can also have notches or grooves making it possible to receive or to block the adjustment means **32**.

Advantageously, the clamping collar **30** also has markers making it possible to adapt the clamping to the pressure and to the diameter in the pipeline **40**.

There are several embodiments making it possible to attach the clamping collar **30** to the base **24A-24K**.

Such as illustrated in figures 3 to 5, in a first embodiment, the base **24A** has a parallelepiped shape with bevels at the corners. The base **24A** has a length of between 2 and 10cm and a width of between 2 and 5cm. The length of the base **24A** is intended to be positioned in a direction perpendicular to the main direction **D** of the pipeline **40**. The base **24A** has in its ends, two side grooves **25A** made in the thickness of the base **24A**, of substantially parallelepiped shape and intended to enable the passage of the strip **31** of the clamping collar **30**.

Such as illustrated in figures 6 to 8, in a second embodiment, the base **24B** has a parallelepiped shape of length of between 4 and 10cm and of width of between 4 and 10cm. The length of the base is intended to be oriented in a direction perpendicular to the main direction **D** of the pipeline **40**. The base **24B** has a central, parallelepiped-shaped groove, as well as two side recesses making it possible to receive and to fix the stirrups **29**. In addition, the base **24B** comprises in its ends, two grooves **25B**, made in the thickness of the base **24B**, substantially parallelepiped-shaped, and intended to enable the passage of the strip **31** of the clamping collar **30**.

Such as illustrated in figures 9 to 11, in a third embodiment, the base **24C** has a parallelepiped shape of length of between 2 and 10cm and of width of between 2 and 5cm. The length of the base is intended to be oriented in a direction perpendicular to the main direction **D** of the pipeline **40**. The base **24C** has anchoring points formed by two recesses making it possible to create openings **25C**. The end of the recesses comprises two axes **43**. Thus, the strip **31** of the clamping collar **30** passes through the openings **25C** and forms a loop around the axes **43**.

Such as illustrated in figures 12 to 14, in a fourth embodiment, the base **24D** has a parallelepiped shape of length of between 2 and 8cm and of width of between 2 and 5cm. The length of the base **24D** is intended to be oriented in a direction perpendicular to the main direction **D** of the pipeline **40**.

The base **24D** further has means for fixing two axes **43** mounted either side of the base **24D**. The axes **43** are anchoring points of the clamping collar **30**, positioned so as to leave a space **25D** free between the edges of the base **24D** and the axes **43**. This space **25D** is intended to enable the passage of the strip **31** of the clamping collar **30**, this thus being able to form a loop around the axes **43**.

Such as illustrated in figures 15 to 17, in a fifth embodiment, the base **24H** comprises two anchoring points **25H**, either side of the base **24H**. Each anchoring point **25H** comprises a housing **49** having a depth of between 0.3 and 1cm and sized to receive an axis **47** of a length

of between 0.5 and 4cm and of a diameter of between 0.1 and 1cm. In this fifth embodiment, the housing **49** extends over the whole width of the base **24H**. The housing **49** is bordered by two parallelepiped-shaped lugs **48**. Preferably, the upper portion has a bevelled or rounded shape to make it possible to guide the movement of the axis **47** towards the housing **49** during the installation of the two axes **47** in the anchoring points **25H**. The two lugs **48** are separated by a slot, sized to enable the passage of the cable **39**, and to retain the axis **47** during the clamping of the cable **39** around the pipeline **40**. Thus, when the cable **39** is taut around the pipeline **40**, the axis **47** is fixed in the housing **49**, retained by the lugs **48**.

Such as illustrated in figures 18 to 20, in the sixth embodiment, the housing **49** of the anchoring points **25I** can have a lower depth without leading to the extraction of the axis **47**. The width of the slot can further be adapted to the width of the elongate element **31**. In the sixth embodiment, the slot is sized to enable the passage of a strip **31**.

Such as illustrated in figures 21 to 23, in a seventh embodiment, the base **24J** has anchoring points **25J** comprising a lug **50** intended to cooperate with a hole made at the ends of the elongate element **31**. In order to mount the elongate element on the base **24J**, the holes of the elongate element **31** are inserted on the lugs **50** so as to also surround the pipeline **50**, then the clamping collar **30** is adapted to the diameter of the pipeline via the adjustment means **32**.

Such as illustrated in figures 24 to 26, in an eighth embodiment, the base **24K** has a housing **49** bordered by two lugs **48** separated by a slot, sized to enable the passage of the width of the elongate element **31**. The slot is covered by a plate connecting the two lugs **48**, thus creating a space of a thickness of between 0.05 and 0.2cm, not enabling the passage of the axis **47**, but only that of the elongate element **31**. Thus, in order to insert the elongate element **31**, the axis **49** must first be removed, then the end portion of the elongate element **31** is inserted in the slot covered by the plate. The axis **47** is then fixed to the end of the elongate element **31**, for example by sliding it into a loop created at the end of the elongate element **31**. Finally, the axis **47** is inserted in the housing **49**. The axis **47** cannot thus be extracted from the housing **49**, as it is blocked by the presence of the plate.

Such as illustrated in figure 27, in a ninth embodiment of the invention, the base **24E** comprises grooves **25E** made in the thickness of the base **24E**. A bore **46** is also made on the lower portion of the grooves **25E** enabling the groove to open outwards. This bore **46** makes it possible for the strip **31** to best adapt to the shape of the pipeline **40**.

Such as illustrated in figures 31 to 33, in an eleventh embodiment, the base **24G** can be mounted on the pipeline **40** before the extinguisher is fixed on the base **24G**. In this embodiment, the base **24G** has a substantially hexagonal shape of length of between 2 and 8cm and of width of

between 2 and 5cm. The length of the base **24G** is intended to be oriented in a direction perpendicular to the main direction **D** of the pipeline **40**.

The base **24G** further has two pairs of side grooves **25G** made either side of the base **24G** in the thickness of the base **24G**, substantially parallelepiped-shaped and intended to enable the passage of two clamping collars **30**. Preferably, the grooves are spaced apart from 1 to 3cm. This type of base **24G** is particularly indicated in the case where the extinguisher has a grooved head **20** mounted on the base **24G**, for example for pipelines **40** with a large diameter, typically greater than DN50.

The mounting of the two clamping collars **30** is done in the same way as described in figures 17a-17d, the clamping collars **30** being able to be mounted simultaneously after one another.

To conclude, the invention makes it possible to develop an automatic water extinguisher being able to adapt to all the existing pipeline diameters.

CLAIMS

1. Automatic water extinguisher (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100) intended to be mounted on an opening (42) of a pipeline (40), said pipeline (40) forming part of an installation configured to contain water pressurised between 5 and 20 bars, said
 5 extinguisher (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100) comprising:
- a one-piece base (24A-24K) having a through-hole (26), and
 - a seal (28) intended to seal the connection between the opening (42) of said pipeline (40) and the through-hole (26) of said base (24A-24K), **characterised in that:**
 - the base (24A-24K) further comprises at least two anchoring points (25A-25K), and
 - 10 - the extinguisher (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100) comprises at least one clamping collar (30) comprising:
 - an elongate element (31, 39) intended to partially surround the pipeline (40), said elongate element (31, 39) cooperating with the base (24A-24K) at said anchoring points (25A-25G), and
 - 15 • adjustment means (32), independent of the base (24A-24K), making it possible to adapt the length of the at least one clamping collar (30) so that the extinguisher (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100) is able to be mounted on pipelines (40) of different diameters.
- 20 2. Extinguisher according to claim 1, **characterised in that** the extinguisher (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100) comprises one single clamping collar (30) and only two anchoring points (25A-25K) disposed either side of the base (24A-24K).
3. Extinguisher according to claim 1 or 2, **characterised in that** the anchoring points (25A-
 25 25G) are through openings oriented in a direction parallel to the main direction (D) of the pipeline (40), the elongate element (31, 39) being mounted on the base (24A-24G) by inserting at least one end of the elongate element (31, 39) in the through openings and by forming a loop around the borders of said base (24A-24G).
- 30 4. Extinguisher according to claim 3, **characterised in that** the through openings are slots made in the base (24A-24G).

5. Extinguisher according to claim 3, **characterised in that** the through openings correspond to the space formed between the base (24A-24G) and an axis (47) of the base (24A-24G).

6. Extinguisher according to claim 2, **characterised in that** the two ends of the elongate element (31, 39) are configured to cooperate with the anchoring points (25H-25K) disposed either side of the base (24H-24K), so that the elongate element (31, 39) partially surrounds the pipeline (40) after action on the adjustment means (32).

7. Extinguisher according to claim 6, **characterised in that** each anchoring point (25H-25K) comprises a housing (49) delimited by two lugs (48), separated by a slot sized to enable the passage of the elongate element (31, 39), the housing (49) being intended to receive an axis (47) fixed to an end of the elongate element (31, 39), the lugs (48, 50) being intended to enable the insertion of the axes (47) in the housings (49) before action on the adjustment means (32) and to block the extraction of said axes (47) after action on the adjustment means (32).

8. Extinguisher according to claim 6, **characterised in that** each anchoring point (25H-25K) comprises a lug (50) intended to cooperate with a hole made at the ends of the elongate element (31, 39).

9. Extinguisher according to one of claims 1 to 8, **characterised in that** the elongate element (31) is a strip.

10. Extinguisher according to one of claims 1 to 8, **characterised in that** the elongate element (39) is a cable.

11. Extinguisher according to one of claims 1 to 9, **characterised in that** the elongate element (31, 39) is formed in a metal material.

12. Extinguisher according to one of claims 1 to 11, **characterised in that** the adjustment means (32) of the length of the at least one clamping collar (30) comprise markers making it possible to compress the seal (28) at a predetermined rate.

13. Extinguisher according to one of claims 1 to 12, **characterised in that** the adjustment means (32) are integral with an end of the elongate element (31, 39).

14. Extinguisher according to one of claims 1 to 13, **characterised in that** it further comprises an element (23) for blocking said through-hole (26) sensitive to temperature and configured to release the through-hole (26).

5 15. Extinguisher according to one of claims 1 to 14, **characterised in that** it further comprises a deflector (22) fixed above said base (24A-24K) and intended to spray the water flow coming from the pipeline (40).

10 16. Extinguisher according to one of claims 14 or 15, **characterised in that** the base (24A-24K) and the head (20), comprising the deflector (22), the stirrups (29) and/or the blocking element (23) form a monolithic block.

15 17. Extinguisher according to one of claims 14 or 15, **characterised in that** the base (24A-24G) and the head (20), comprising the deflector (22), the stirrups (29) and/or the blocking element (23) are independent, the head (20) being mounted on the base (24A-24K) by screwing.

18. Fire protection installation including:

20 - at least one pipeline (40) having at least one opening (42), and
- at least one extinguisher (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100) according to one of claims 1 to 17.

19. Fire protection installation according to claim 18, **characterised in that** the pipeline (40) is a pipeline painted or pre-painted on its internal and external faces.

25 20. Installation according to claim 19, **characterised in that** the painting of the pipeline (40) comprises an epoxide polymer binder.