

Hose handling

In regular fire training a relative small amount of time is spent on hose handling. This is something that for some part has developed historically. When the previous firefighter course was put together in the 90's, the interior attack was almost exclusively performed using a high pressure (HP) attack line. Low pressure setups were most of the time used for defensive exterior tactics. These setups are usually very static. Once the hose lines had been deployed, they weren't moved again. For an interior attack, a lot of attention was dedicated to keeping the two BA members of the attack line close to each other for safety purposes. The hose man was preferably keeping hand contact at all times with the BA of the nozzle man. The transition to using low pressure coils for interior attack showed that this mode of operation has serious drawbacks.

1 Handling a high pressure hose line

A lot of fire stations still primarily use a high pressure line for an interior attack. The HP is after all suited for quite a large number of different fires. The biggest benefit of the HP is the flexibility of the line. The hose man can very easily carry a couple of meters worth of hose line with him. He just has to form some coils to carry along. By doing so the nozzle man can advance several meters.

The hose man can choose his position behind the nozzle man with the HP either at their right hand or their left hand side. However it's also possible for the hose man to place himself on the other side of the hose line. The hose line is then running in between the two firefighters. This position allows the hose man to easily look both forward and back. This is a lot harder if he were sitting directly behind the nozzle man.

1.1 Providing additional hose line

When I started basic recruit training in Brussels in 2004, a lot of focus was put into operating a HP line. This was and still is after all, our predominant weapon of choice.

Brussels is undoubtedly the organization in Belgium that has the most experience with the high pressure line. One of the aspects that was given much attention, was providing additional lengths of hose line. After all it is impractical when the hose line is stretched up to the point of attack without additional hose line being drawn at key places.

A fine example of this is a fire on the third floor. If a HP line is stretched just past the front door, the attack crew can start its progress. However after they've advanced for a couple of meters, they'll become stuck. At that point they're pulling a hose line that has a lot of different friction points (the door frame, the stairs, the apartment door, a 90° angle, ...) In fact the attack crew has to pull



Figure 1 The attack crew is kneeling in front of the door. The additional hose line is placed in loops behind them. (Photo: Pieter Maes)

hard enough to first overcome all of the friction and second to get the line from the reel. It goes without saying that this is impossible.

In order to avoid these problems, a HP line in Brussels is deployed by a crew of four. When the nozzle man arrives at the point of attack, about five meters of additional hose line will be put in loops. The same is done at the entrance of the building. Finally, some loops are also put in place at the fire engine. That way, there's about 15 meters worth of extra hose line covering the path of the attack. This allows the crew to advance more swiftly.

1.2 Pulling up a HP hose line

Another way to deploy a HP line which is used frequently by Brussels firefighters, is pulling up the line from the outside of the structure. This method is suited for fire operations up until the fifth floor. In Brussels, the attack crew carries along two 30 meter ropes. These ropes can also be used for rescuing oneself. Most of the time however, the ropes are used to pull HP lines up. The attack crew will throw a rope down from the window. The same can be done in open stairwells to get a line up.

It's important to realize this can't be done from the fire compartment. What's more, the room in which the window is opened mustn't be in contact (yet) with the fire compartment. Otherwise extra air will be made available to the fire. In the past it has happened that fire crews underestimated the development speed of the fire. They were facing rollover the moment they got the nozzle in hand.

A rope falling down is the signal for crews downstairs that the attack crew wants to pull up a HP line. The nozzle is tied to the rope using a clove hitch and a half hitch (see Figure 3) after which the hose line is pulled up (see Figure 2).

It's important for the engine pump operator to open the flow of water only after he's been asked to by the commanding officer. This way the HP line weighs less and pulling it up is made significantly easier.

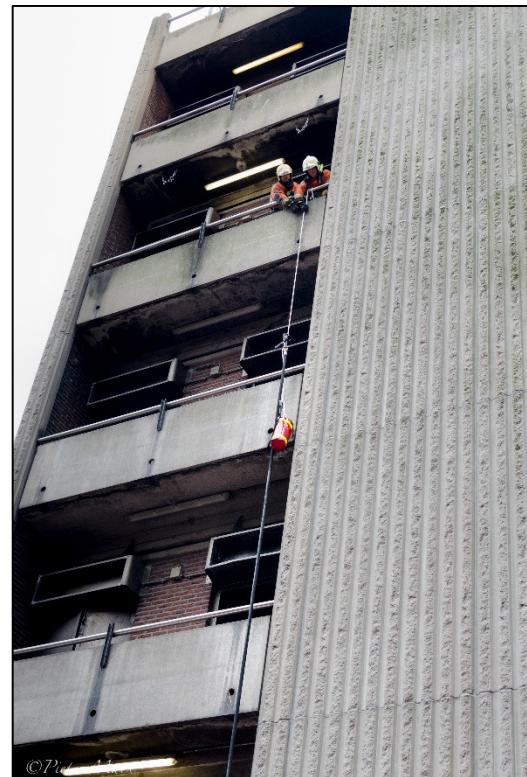


Figure 2 Pulling up a HP hose line using a rope. (Photo: Pieter Maes)



Figure 3 A half hitch and a clove hitch are used to tie a rope around a HP nozzle. (Photo: Pieter Maes)

Once the HP line has arrived up top, the rope is untied. Next, about 10 meters of additional hose line is pulled up. This may be more if a larger distance needs to be covered from the window. It's the officer upstairs who will have to decide on this. Once this is done, the HP line is tied down. Every Brussels firefighter has piece of rope on his belt he can use for this.

This technique allows the quick deployment of a HP line up to the fifth floor and provide additional hose line there as well.

2 Handling a low pressure hose line

The introduction of coils and cassettes in the Belgian fire service caused an increase in the use of low pressure Ø 45 mm (LP 45). This method of operation allows higher flow rates to be used on interior attacks. After all, the heat release rate of under ventilated fires, which the fire service is facing more and more these days, can increase very fast. It is therefore safer to have access to larger flow rates.

However if one were to handle a LP 45 the same way as a high pressure line, results won't be optimal. A lay flat low pressure line is a lot less supple than a HP. So it's not possible to quickly form some loops. The old procedure of two crew members seated close to each other is counterproductive.

2.1 Advancing a LP 45

Normally the attack crew will advance with the coil in hand up to the point of attack. At this point, a single or a double coil can be deployed. This will lead respectively to 20 or 40 meters of additional hose line. This replaces the several extra loops that had to be stretched on a HP.

As soon as the crew starts to advance, they need to adopt a new routine. The hose man needs to make sure that the nozzle man has enough freedom of movement. This is impossible if he is positioned immediately behind the nozzle man. The hose man is ideally seated about 2 to 3 meters behind the nozzle man. Occasionally he will also have to go back to a friction point to stretch additional hose line (see Figure 4).



Figure 4 The hose man is two to three meters behind the nozzle man. His body is positioned towards the hose line. (Photo: Pieter Maes)

The nozzle man will be looking straight ahead. He needs to analyze the situation in front of him. He can use his nozzle to secure the area around him (short pulse and especially long pulse). He can also use his water to extinguish the fire (pencilling/painting/massive attack). The hose man is preferably placed with his body positioned towards the hose line (see Figure 4). This allows him to observe the situation behind him. He needs to watch the behavior of the smoke behind the crew. This means he'll know if any closets for instance, start to burn behind the attack crew. Things like these pose an important risk to the fire crew. It's up to the hose man to watch out for this. Aside from that, he'll also have to check that the hose line doesn't get stuck anywhere. If that were to happen, he will first inform the nozzle man. Then gas cooling can be performed while the hose man returns to the friction point to pull additional hose line. Finally, the hose man is still able to communicate easily with the nozzle man when he is at right angles to the hose line. This is also an important fact in the positioning of the hose man.

The hose man can also create a loop while advancing. This loop will be circular in shape. Such loops can be placed on the floor, but it's also possible to stand them up against the wall. This technique may come in handy in tight spaces with little room to manoeuvre. Finally it's also possible to roll the loops along. This way it's possible to relocate several meters of additional hose line. In any case, the hose man now has a much more active role to fulfill than he used to. He needs to continually watch what is happening behind the attack crew. Next to that he also has an important job to do in moving the line. The further the line is advanced into the burning compartment, the harder this task will become.

Again it has to be pointed out that adding a door man to the attack crew has a lot of added value. Aside from controlling the door opening, he will also help in moving the hose line.

2.2 Withdrawing a LP 45

In basic firefighter training there hasn't been any focus put onto withdrawing an attack line until now. Yet this is a skill that can save lives. In the future, the risk for problems during an advance will increase. Under ventilated fires will have an increase in heat release rate the moment the fire crew opens the door to make their advance. Chances are increasing that an attack crew has to withdraw in an environment with low visibility while temperature is rapidly increasing and flames are starting to run across the ceiling.

At that point, it's important for the nozzle man to switch to long pulses. It no longer matters whether different smoke layers get mixed up. Likewise it's no longer important to preserve the balance of steam expansion versus smoke gas contraction.

A life threatening situation for the attack crew has formed. It's up to the nozzle man to do something about it. If long pulses don't yield the desired result, he can choose to flow the nozzle continuously into the upper end of the smoke layer at the maximum flow rate (400-



Figure 5 The hose man forms two loops while the nozzle man analyzes and controls the situation. The loops make for additional hose line to advance later on. (Photo: Pieter Maes)

500 litres per minute). At the same time, the attack crew needs to make a (swift) withdrawal from the compartment in which things are getting out of hand.

If long pulses are sufficient, a method can be used in which long pulses are interchanged with small portions of retreat by the nozzle man. The hose man can bring the line back continuously. This will become more difficult if water needs to be flowed at all times.

After all, it's not easy withdrawing a hose line that's flowing at 400 litres per minute. This flow means substantial reaction forces at the nozzle. The possibilities to handle this, differ from person to person. An athletic nozzle man of 1m90 will have an easier time handling the hose line than a skinny nozzle man of 1m65. That's why it's important that we practice withdrawing the hose line, so everyone will know what works for them and what doesn't.

2.2.1 Hose man forms a loop

For most firefighters it will be easiest if the hose man forms a loop about three to four meters from the nozzle man. He can accomplish this by letting the line pass behind his back (see Figure 6). With one hand he is guiding the line to the nozzle man in front of himself. This line mustn't become taut. If he does pull it too tight, he'll pull the nozzle out of the hands of the nozzle man. It goes without saying that a hose line flowing 400 litres per minute will start flying around once it's no longer held firmly. If the line isn't pulled from the nozzle man's hand, it will at least be directed lower and the water will no longer reach the hot upper smoke gas layer. An additional benefit of a more or less straight piece of hose line between nozzle and hose man is a relatively low reaction force sideways. Most people will have a hard time withdrawing a flowing hose line while lateral reaction forces have to be countered. In a crouching position this is anything but easy.

The hose man can keep on withdrawing. At the other side a loop will be formed that will grow larger as he's retreating (see Figure 6). This loop must not become too large. At some point it will become so large that the nozzle man might trip over it. Since the nozzle man is pulling back under very difficult conditions, odds are very likely he will trip. To avoid this from happening the hose man needs to keep an eye out. If the hose man is three meters away from the nozzle man, the loop will be six meters of hose line before it will hinder the nozzle man. From that point on, the hose man will have to drag the loop along as well.



Figure 6 The nozzle man is on the left of the picture and is withdrawing. The hose man has formed a loop behind his back. With one hand he is managing the line to the nozzle man and with the other he is steering the other lengths of hose line. (Photo: Thierry Brossé)

2.2.2 Nozzle man forms a loop

There is another option. In this case, the nozzle man will form a loop around himself. This is much more challenging. The nozzle man will have to control the flowing hose line as well as drag the loop along. The advantage of this is that there's no limitation on the length of the loop. The hose man can then quickly crawl back to the door opening and start pulling back hose line from there. In this case, he also needs to be careful not to pull the nozzle out of the hands of his colleague. It's even preferable that there's always a small loop at the side of the nozzle man (see Figure 7). The hardest part of this method of withdrawal after all is forming the loop behind the back. If the hose man pulls the line taut, the nozzle man needs to redo this hard part (forming the loop) over and over again.



Figure 7 The loop is formed by the nozzle man. The hose man can crawl back towards a friction point and once there, pull back the hose line. (Photo: Thierry Brossé)

The hose man can collect the hose line in circular loops. The moment the nozzle man arrives at the door, the hose man can move these loops to the next doorway or exit.

It's obvious that having a door man in both scenario's is a big help in getting the attack crew out unharmed.

2.2.3 Standing up

Firefighters will have the tendency to stand up and walk out in a bent position. That way it's easier to drag the hose line. Especially during practices, this will be a problem. However it's very important to realize that forced withdrawal takes place in situations where the fire is pushing the crew back out, so to speak.

In such conditions, temperatures are running extremely high. In other words it won't be possible to stand up in a bent over position. The temperatures that come with such an emergency situation will not allow for it.

3 Practice

For firefighters to be able to retreat safely and swiftly in difficult conditions, they'll need to practice. Firefighters that predominantly work with HP can perform these exercises with a HP line. Fire services that frequently employ both systems (HP and LP), should practice both systems. In fire services that mostly use low pressure, the last system should be practiced more.

Practicing the withdrawal of a flowing attack line in difficult circumstances will also have several secondary effects. The two (or more) crew members will learn to cooperate. After



Figure 8 Ed Hartin conducting a tactical withdrawal exercise in between two containers during a 3D-firefighting course.
(Photo: Pieter Maes)

all this isn't something you can do on your own. Skills like choosing the right position in relation to each other or to the hose line, communicating and handling a hose line will improve drastically.

Once the basics have been laid out by practicing on a courtyard, the same exercise can be repeated in between two walls (see Figure 8). Next the routine can be done in an environment with furniture. Crews can first train without breathing apparatuses. Next BA's can be added. This will cause slight variations regarding the centre of balance, contact with the hose line, ...

This will all lead to fire crews deploying and withdrawing attack lines more easily when necessary. Both their individual and team skills will improve. This will in turn lead to more efficient and safer firefighting.

4 Bibliography

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