

Ingström Escape Chute permits quick mass evacuation

Life (safely) dangling from a Twaron thread

A frightening scenario: fire in a multi-story building. Escape via the (emergency) staircase is possible, at least as long as heat and smoke are kept out. Suffocation by smoke in particular causes many fatalities. Trying to get away via the roof and wait there for a helicopter to arrive is another option. But when a helicopter comes close, the rotor blades act like a huge fan kindling the fire. Yet another option is to wait for the Fire Department to arrive with their ladder truck or sky-lift, but these vehicles also have their limitations: evacuating large numbers of people in a short time is not possible. Is this the end? Fortunately not, because more than 30 people per minute can be evacuated with the "Ingström Escape Chute" reinforced with Twaron - an invention of the Fin Stig Ingström.



The Ingström Escape Chute hanging from the air traffic control tower at the Helsinki airport.

The Ingström Escape Chute, marketed worldwide by Finnish company AB Mobiltex OY, bears some resemblance to a giant nylon stocking. The Escape Chute is just many times longer - it may have a length up to 150 meters - incredibly strong, and also heat-resistant up to 800 °C.

The operation of the chute is as simple as it is brilliant. The evacuee sits down on the rim of the Escape Chute and lowers him - or herself slowly. Around the evacuee a kind of cocoon is formed, much like a football in a nylon stocking. By pressing the legs tightly against the lining of the chute it becomes possible to stand up straight. As soon as the evacuee is standing up and slowly relaxes both legs, he will slide down through the chute. You don't go down at an awkward pace, because you can easily reduce speed by pressing your arms and legs against the side of the chute. This way, mass evacuations can be realized fast and safely.

Mass evacuations realized fast and safely

Worldwide, over 3,000 Ingström Escape Chutes have been installed so far, mostly customized for a specific application, for instance, in tall buildings, ferries, grain silos, air traffic control towers, or giant shovels used in the mining industry. In addition, there is a mobile version of the Escape Chute. It can be attached to a sky-lift or ladder truck, thus immensely reducing evacuation time. As a comparison: the chute can evacuate dozens of people per minute, a sky-lift 30 to 40 people an hour! It is therefore right to say this is a truly innovative invention, with an important role being played by aramid fiber Twaron.

Safely on the ground

"The Escape Chute consists of three separate layers," explains Dolf Woldringh, Technical Account Manager at Teijin Twaron's Composites department and responsible for the contacts with AB Mobiltex OY, the company of inventor Stig Ingström. "The inner layer is made of two materials, also called the hybrid fabric. Twaron is applied along the length of the chute. This is done because of the fiber's flexibility and especially for its enormous strength. After all, the inner layer bears the load of the total chute and therefore must be able to withstand approximately 10,000 kilos. This means a maximum load of 5,600 kilos per meter width of fabric. Flexible Rohvyl® (yarn produced on the basis of PVC - chlorofiber) is used across the chute. For these sections are not exposed to high forces," says Woldringh.

Although Twaron was first of all chosen because of its high strength, its flexibility also was a determining factor. "There are various types of Escape Chutes. Some are stored away in containers. When the chutes are regularly used for drills, this means they have to be folded out and up a lot. Twaron is excellently suited for that purpose."

Within 20 seconds safe and sound on the ground

An additional benefit is that Twaron is also heat-resistant, even though that is not strictly necessary for application in the inner layer. The outer layer of the Escape Chute, made of flexible glass fiber, takes care of that. This layer provides protection against fire, heat, and smoke, and can resist temperatures of 650 up to 800 °C. When firemen spray the chute with water, it can even be used at higher temperatures than that.

Finally, the centered layer: this is made up of the very elastic 'spun cell' - made of elastomer and modacryl (Lycra®) - and can easily increase three times in size. It is this layer, comparable to an elastic knee supporter, which - as it were - "grabs" the evacuee as soon as he presses his arms and legs against the chute.

That the chute really works, was demonstrated in Australia, in October 2000. A 540 ton mining shovel (more than five meters high) caught fire and the heat blocked the door of the cabin. The operator broke a window pane and got out onto the side platform, where the Escape Chute was mounted. He activated

the chute and within 20 seconds was safe and sound on the ground. In this particular case, a life was quite literally hanging from a (Twaron) thread.

Growing demand?

Teijin Twaron and Mobiltex did not team up right from the start. "Mobiltex first bought Twaron through a weaver in Finland. But as this is a very specialist application, we now work directly with Mobiltex. In short, for us this application was a very exciting opportunity. The Escape Chute is a typical aramid application: extremely strong and very flexible.

But there are more fibers suited for such uses. "That's right, Technora for instance", says Woldringh. "An excellent alternative. But I don't think Mobiltex wish to change fibers soon. Twaron is a high-quality fiber and technically speaking the right one for the job. Besides, the construction of the chute calls for material that has been certified and approved in all countries of the world. One change will mean that certifications will have to be obtained anew. That is not really practical and very costly, of course."

The Escape Chute, a typical aramid application

The dramatic events surrounding the WTC in New York have influenced demand for the Escape Chute. "In particular, there is a growing demand for the Escape Chute in buildings. After all, "safety thinking" has radically changed since 9-11. On the other hand, the Escape Chute does not come cheap. For safety's sake no price should be too high, but not all authorities think that way. And sometimes there is simply no money. Mobiltex also does business with companies and private persons, but authorities represent a very important group of customers. There will definitely be growth, but perhaps a bit whimsical. For Twaron it remains a true niche market. Still, the Escape Chute is a unique product. A product that can save lives and at the same time showcases Twaron's strong points."

