



Introducing Ingstrom  
the world's  
most efficient  
emergency evacuation  
system

**GENERAL  
and  
TECHNICAL  
DATA**



**THE INGSTROM ESCAPE SYSTEM**

# THE INGSTROM ESCAPE SYSTEM

## TECHNICAL DATA

### HOW THE SYSTEM WORKS

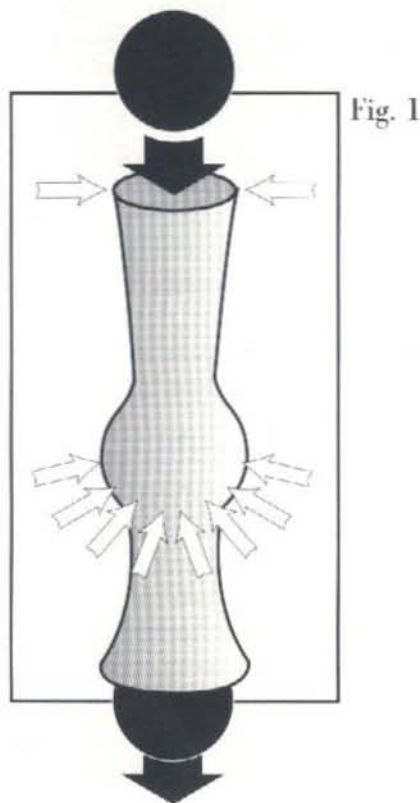
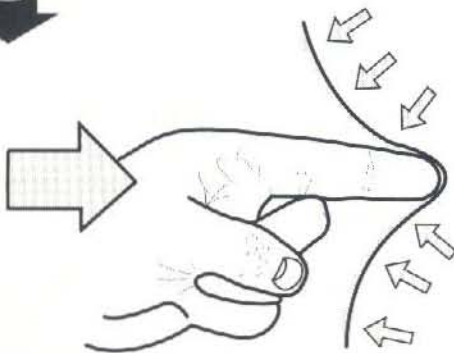
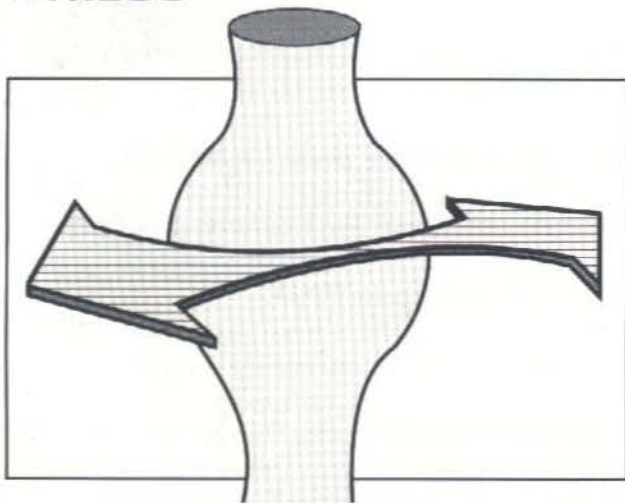


Fig 2



### EXTENSION STRESS



The diameter of the elastic chute at rest was calculated so as to be smaller than the persons/objects intended to enter it (Fig. 1).

Therefore, as a person / object passes down the elastic braking chute, the latter expands along its radial (Fig. 2), bringing into opposition an elastic pressure (resistance to extension) and an extension stress of approximately equal force (Fig. 3).

In practice, this is evidenced by friction on the body as it slides down.

Having entered the chute, the user allows himself to slide down and to control his speed by simply creating bulges by pushing out his elbows or knees (eventually coming to a complete standstill if required).

For a more rapid descent, the user keeps his body as straight as possible.

No other method of evacuation allows for such flexibility in control of descent speed: which may vary from 0 - 5 metres per second.

The system is in fact made up of three chutes fitted one inside the other (Fig. 4)

**Chute 1** is an inner support chute. Evacuees slide down the inside of this chute which bears the tensile stress.

**Chute 2** is an elastic braking chute covering chute 1 and enabling the user to control his/her speed of descent.

**Chute 3** is a flameproof chute whose sole function is to protect the two underlying chutes from fire. This outer chutes not required when installed in a fire shaft.

# THE INGSTROM ESCAPE SYSTEM

## TECHNICAL DATA

### CHUTE 1 SUPPORT CHUTE

A list of materials likely to possess the properties required was drawn up by computer and this directed preliminary research towards petrochemical products. The industrial fibres which are derived from such products do indeed possess a whole range of properties which are of great importance to industry.

The TITUS computer at the French Textile Institute and an English team consisting of nine research engineers from COURTAULD'S Birmingham Laboratory determined the best possible arrangement of fibres.

The materials which make up **Chute 1** (the support chute) are **KEVLAR**, a Dupont de Nemours industrial fibre of the aromatic polyamide class and **KLEVIL** which is a modacrylic.

**KEVLAR** performs better than any other fibre currently on the market.

- its tensile strength is 270kg/mm<sup>2</sup>
- its modulus of elasticity is 10 times lower than that of steel
- it displays exceptional resistance to chemical agents and abrasion
- it withstands temperatures of 240°C

**KEVLAR** is used for the warp and **KLEVIL** the weft, resulting in a cloth-type weave, produced on a flat circular loom.

Pieces are assembled using the parachute method. They are held together by zig-zag connecting seams using a special polyester thread.

Strength and tensile tests were carried out at CNAM's testing laboratory.

The resultant chute has an ultimate tensile strength of 15 tonnes, or the equivalent of a heavy goods vehicle.

### CHUTE 2 ELASTIC BRAKING CHUTE

The materials which make up Chute 2 (braking chute) are **SPANZELLE** of the polyurethane class and a modacrylic.

**SPANZELLES**'s most important property is its modulus of elasticity (260%). It also withstands temperatures of 100°C.

This chute is produced on a jersey loom into which **SPANZELLE** (an elastic fibre) is introduced. Assembly is as specified for Chute 1.

Chutes 1 and 2 are the basic elements of the escape system, but they require protection, either by installation in a fire shaft, or by insertion into a third chute.

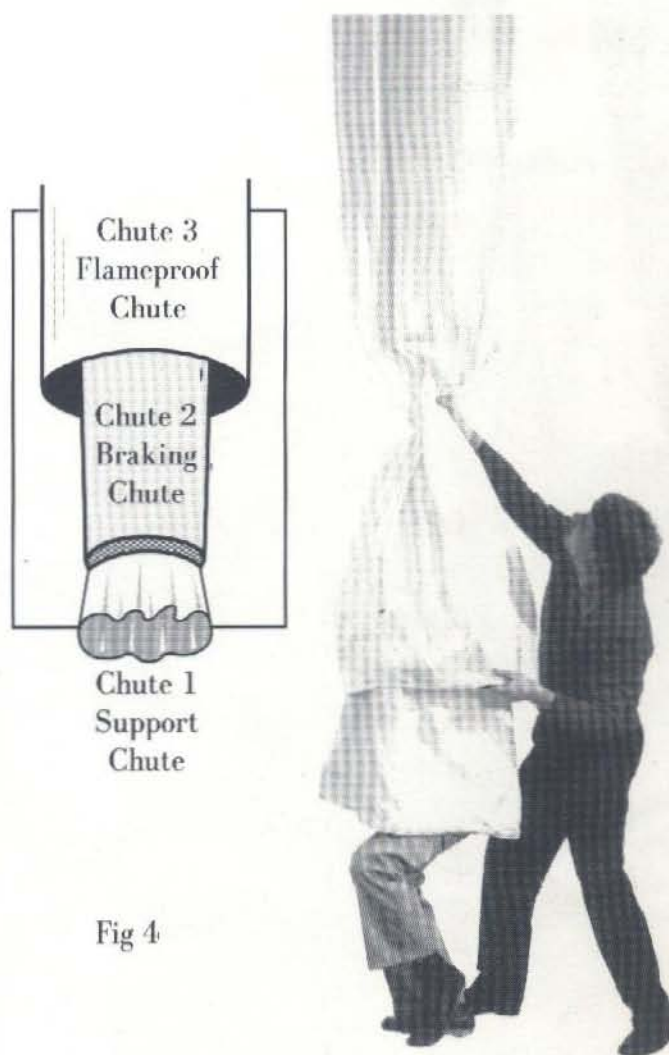


Fig 4

# THE INGSTROM ESCAPE SYSTEM

## TECHNICAL DATA

### CHUTE 3 FLAMEPROOF

The sole function of **Chute 3** (flameproof chute) is to ensure protection against fire.

It is made of incombustible glass fibre and withstands temperatures of up to 800°C.

It is positioned so as to create a sizeable air layer between it and the braking chute. On account of its high thermal inertia, this air layer guarantees protection against heat.

If water spraying can also be arranged, the installation will be protected indefinitely.

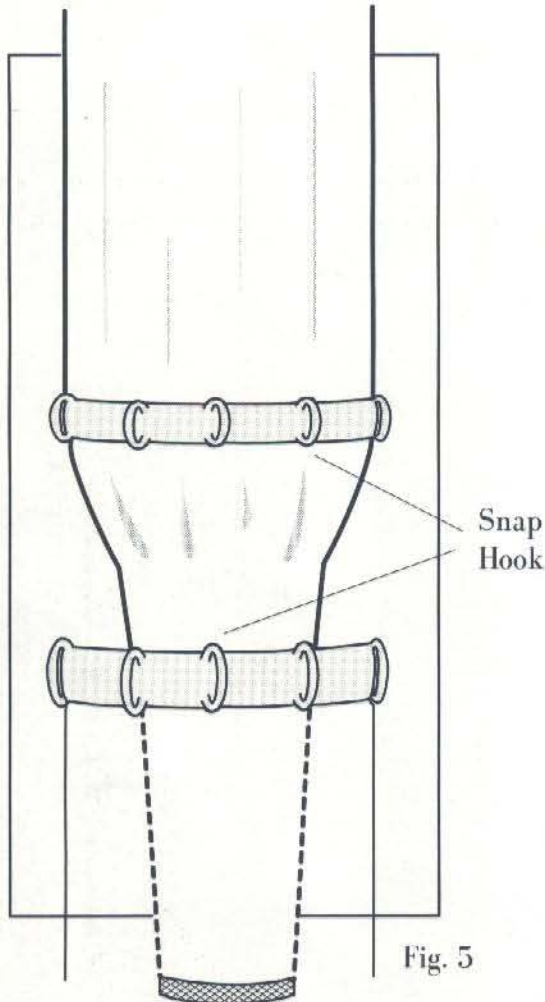


Fig. 5

### ADDITIONAL BENEFITS

The chute solves problems relating to the handling of industrial goods, movement of personnel from floor to floor, and problems associated with games and leisure activities.

#### 1. Handling

The trend nowadays of constructing multistorey warehouses calls for a technology able to solve the problem of handling goods quickly and as cheaply as possible.

Here also the Escape Chute is of great use as a wide range of goods may be passed down the chute which uses up no energy and never breaks down.

Various other functions may of course be performed depending on the specific requirements of the industry in question.

#### 2. Marine Uses

Drilling platforms, ships and shipyards

The Chute may also be usefully installed in shipyards where it enables staff to move about in record time both inside and outside the ship.

#### 3. Mobile Rescue Equipment

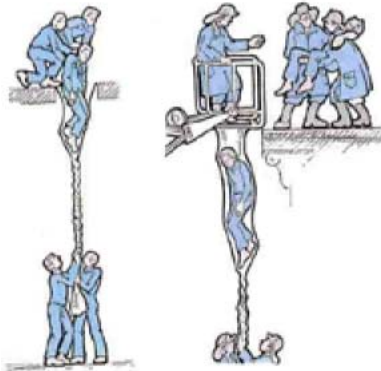
Where evacuation height varies, as is the case with firemen's ladders, hoists and hydraulic platforms, chute length can be altered by means of modular elements measuring 1m, 2.5m or 5m linked together by means of snap hooks (Fig. 5).

#### Storage of Chute

New Chutes are delivered and installed folded up inside their protective container, ready for immediate deployment.

Depending on application, storage containers are fabricated from either fibre glass or metal, and provide year round weather protection. After use,

## Ingstrom Escape Chute AB Mobiltex OY



The INGSTROM Escape Chute is fast and efficient escape system. When permanently installed the escape chute is ready to use within a few seconds from release. Depend of the length and construction it enables as many as 30 people a minute from danger or fire.

INGSTROM Escape Chute is a complete escape system.

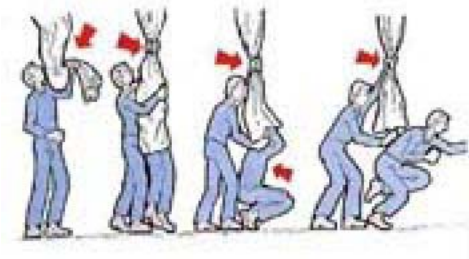
- Chutes for indoor, outdoor or movable use
- Key in hand installations
- Complete training system for use of the chute
- Service of the chute

A simple escape system



It is simply to learn to use the INGSTROM Escape Chute in a safe way. The construction of the chute helps to protect the evacuees from heat, fire and used for rescuing the old and the handicapped, and it enables unconscious patients and those on stretchers to be brought to safety, with training. This is something what is difficult and heavy to do with traditional rescue equipment.

Three-way protection



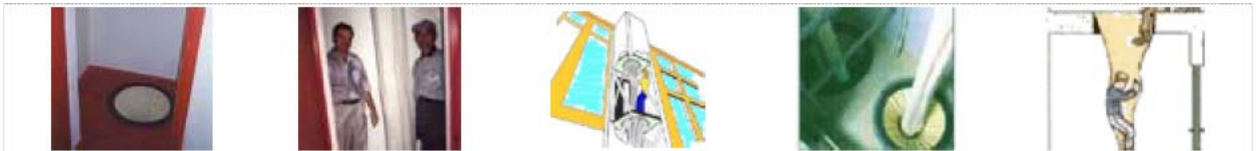
The escape chute consists of three layers. The outer layer is material which does not ignite even when exposed to open flame. The intermediate which helps to regulate the speed at which the escapee passes down the chute. The inner, supporting layer is made from Kelvar fibre, which has ten times the tensile strength of chlorovynilique fibre to help to avoid injuries caused by friction.

## Solutions - Multi Entry

This multiple escape chute system is installed inside a protected vertical shaft enclosure that is constructed in accordance to local fire code that provides protection from fire effects for evacuees so that it can be used safely for egress. This interior chute is constructed of 2 layers, the outer layer provides a speed restraining effect, and the inner layer supports the whole weight of chute. The chute is installed in segment at each floor level inside the fire-protected shaft, one segment of chute per floor, from the highest floor to the ground floor on the same vertical line. One chute serves many floors and occupants can gain access to the chute at each floor.

It has no length and height constraints. The longest one in use is 165m at the Nation Tower, Bangkok, Thailand.

### Images



## Solutions - Egress Design

### "Accessible Means of Escape Design"

This egress design is a unique and integral part of the enhanced staircase development of vertical exits in tall building. It requires the ability of incorporating the facility of multiple escape chute system inside the enhanced staircase enclosure. When fire occurs, the disabled and the severe mobility impaired will have to make their way, assist or unassisted, and take temporary refuge inside this stair enclosure that would get them to the ground floor more quickly and relatively safely or to be assisted by helpers down the stairs.

### Images



## Solutions - Single Entry

This one entry chute installed in old or existing building whereby there is no possibility of incorporating the "Multi-Entry" chute. Each chute installation at window, balcony, rooftop, best serves the occupants of that particular floor. This exterior chute is constructed of 3 layers, the outer layer is fire resistant - protects the chute against flames, the middle layer provides a speed restraining effect, and the inner layer supports the whole weight of chute. This 3-way protection protects the evacuees once inside the chute from fire, heat, and smoke during evacuation. Available in a maximum length of 200m. The longest such chute in use to date is 122m at Intraco Building, Warsaw, Poland.

### Technical Information

- Recommended only when there are no possibilities for installation of multi-entry mode.
- One chute serves one floor.
- Weather sensitive, sensitive to strong wind, need more maintenance for outdoor units.
- Need stable platform to support people with a total weight of 1000kg regardless of chute length.
- Custom makes platform and need about 2sqm space for installation.
- The unit has a unique entrance and the full-length chute is folded into a closed container with a rapid opening device.
- The container is mounted on a chute platform.
- Installation sites: window, balcony, terrace, rooftop, off-shore deck.
- Maximum length of chute or height of building is 200m.
- Three layers chute fabrics: Outer layer - Fiberglass, Middle layer - Spuncell elastic, Inner layer - Kevlar).
- Other accessories: Emergency light, Exit light. Walky-talky, Escape smokes hood.

### Images



## Solutions - Industrial Applications

With the Occupational Health & Safety legislation now in place, employers must provide adequate means of quick escape for workers working in height. In the event of a hazard in the workplace or workstation at tall structure, such workers have a right to egress quickly, which is the responsibility of employers and safety managers. In many situations, escape chute usability by all people provides solution to such emergency situations. Escape chutes can and are used in various industrial areas, anywhere where a worker could be trapped in an emergency situation with no other means of emergency egress. For example, with installation of an escape chute in grain silos, process plants, control towers, hydraulic mining shovels, overhead cranes, etc., in an emergency situation, workers can quickly get to the ground in less than a minute.

### Image Gallery



## Solutions - Portable Entry

Escape Chutes can be fitted to Fire Department Aerial Ladders and Snorkel Platforms, this will increase the rate at which evacuees can be evacuated from a high rise building, thus reducing the risk exposure of the fireman. The movable/portable chute has become standard rescue equipment used by fire bridges worldwide for high rise rescue operations. With additional equipment, the portable platform can also be mounted on the parapet of the balcony and window. The chute is constructed of 3 layers, the outer layer is fire resistant-protects the chute against flames, the middle layer provides a speed restraining effect, and the inner layer supports the whole weight of chute. This 3-way protection protect the evacuees once inside the chute from flame, heat, and smoke during rescue operation. The longest one in use is 61m on Bronto Skylift.

With the Aluminum legs the standard fire truck platform can be move to the windows or balcony. The set contains of 2 expanding vertical legs (work with 2 hydraulic jacks) and 2 horizontal arms.

### Images

