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RESPONSABLE
INFORMATION ABOUT SAFETY AT HEIGHT

SPECIAL ISSUE – APRIL 2004

EDITORIAL
RAIL- OR CABLE-BASED FALL ARRESTER?
"THE RIGHT SYSTEM AT THE RIGHT PLACE"

Why have we produced this special number?

Quite simply to answer as clearly as possible a question which is constantly cropping up during our training courses, namely:
"Is it better to install a rail- or cable-based system? ... with a rigid cable or flexible cable? ..."
Everyone generally has his or her own idea about the matter, without however being in full possession of all the necessary information and criteria for making the right choice.

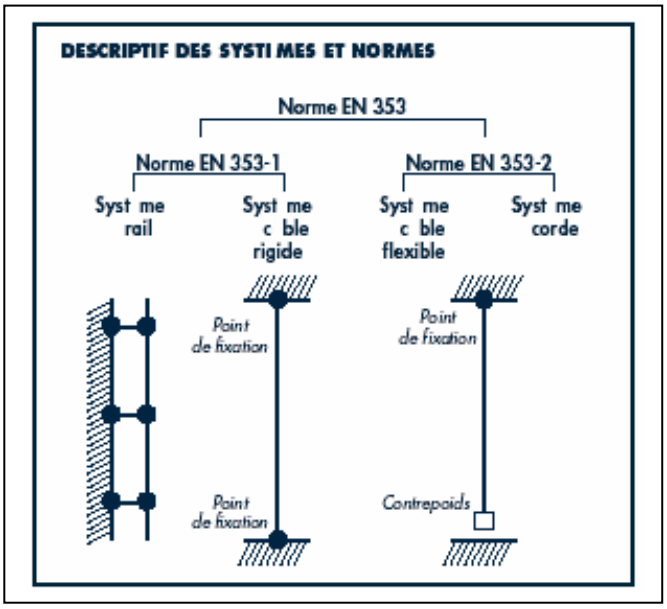
Each system in fact has its advantages and disadvantages, with some suiting certain situations better than others. Those who are "unconditional supporters of the rail-based system" are no more right than those who are "unconditional supporters of the cable-based system". In order to make the right choice potential users need to know whet products are available on the market, their design, the way they work and above all the differences between them. This also presupposes having drawn up a set of specifications explaining clearly the context, the expectations connected with their use and the constraints which can or cannot be tolerated.

We have set out a table comparing the various products available on the market. It has been drawn up from the manufacturers' commercial documents and brings out their distinguishing features. We have supplemented this with a series of comments to which we would like to draw your attention in order to shed more light on your choice and to show you that there is more than one version of the truth.

This information is the fruit of 25 years experience on the French and foreign markets. We hope that it will be useful to you. Rail- and cable-based systems should no longer have any secrets for you.

Bernard Cuny

DESCRIPTIONS OF THE SYSTEMS AND STANDARDS



Key:

Standard EN 353

Standard EN 353-1 — Standard EN 353-2

Rail system — Rigid cable system — Flexible cable system — Rope system

Anchoring point — Anchoring point

Anchoring point — Counterweight

ONE CRITERION OF CHOICE: THE HEIGHT OF FALL

This is the crucial criterion. What height of fall should one tolerate? Experience tells us that the greater the height of fall, the greater the risks, and the more likelihood that contact with structural elements will cause injuries. Conversely, the shorter the fall, the less it is likely to result in injury, to the point of being little more than a non-event.

There are all sorts of alternatives available on the market: carriage with direct link by a karabiner, with tether and karabiner or again with energy absorber, tether and karabiner. It is obvious that a fall with a single linking karabiner will not exceed 20 cm, whereas with an intermediary tether it can be as much as 80 cm. If an absorber is added, the height of fall may be increased, bearing in mind that the standard specifies that it shall not exceed 1 metre.

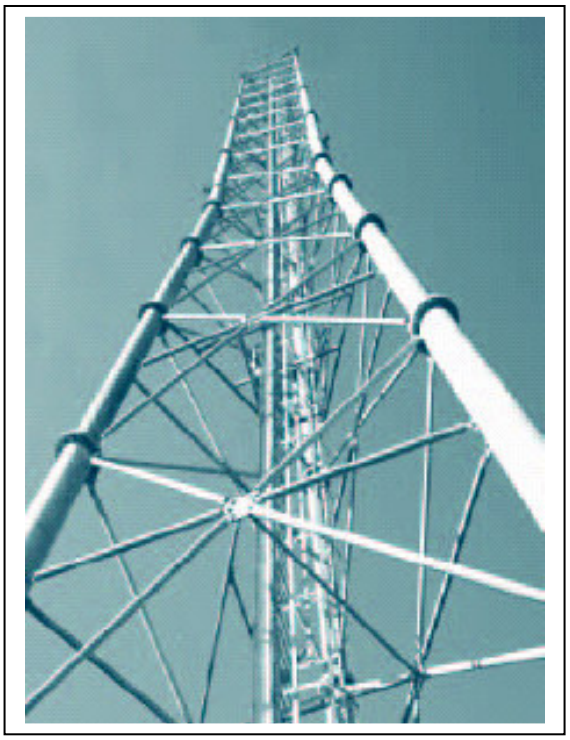
Logic dictates that one should opt for the shortest link. Attention should then be devoted to the freedom of movement offered by the various systems, at least if such freedom of movement is a requirement of the specifications.

THE POSITION WITH REGARD TO PYLONS

Market forces and Cartesian logic do not always go in the same direction. To begin with, latticework pylons, the most widespread type in Southern Europe, were fitted with rail-based systems. When cable-based systems made their appearance, telecom and television companies rushed to abandon rail in favour of cable, which they deemed more functional and also less expensive. It must be acknowledged, that in addition to numerous instances of malfunctions in the first rail-based systems, the flexible structure of this type of pylon did not help matters. Cable-based systems had and still have the advantage of being flexible and having no trouble going with the movements and distortions of latticework pylons which, like a reed, sway back and forth in the wind. Logically, given this satisfactory product/structure match the story should have ended there. However, competition and the opening up of European markets have once again clouded the issue in the eyes of those who are less well-informed.

Is this a reflection of differences between the Germanic mentality and the Southern European mentality? At all events, our German neighbours have adopted "rigid" systems whereas we Latins would appear to have greater affinity with "flexible" systems. In Germany, the pylons are tubular and completely rigid. In France, the pylons are made of metal latticework and are relatively flexible in the wind, with tubular pylons being reserved in France for small plots of land (?)[1], in built-up areas for example.

As long as standards were on a national basis, exerting a certain amount of protectionism, rail-based systems developed in Germany, without any incompatibility since the rigidity of the system is perfectly adapted to the rigidity of tubular pylons, and without being threatened by cable-based systems. When standards started to be European-wide, our German neighbours went on the attack against our latticework pylons, in an attempt to impose their rail-based system, which had undoubtedly made a certain amount of progress. This commercial onslaught has borne fruit since part of the country's stock of pylons is now fitted with rails, despite the inconsistency that has always existed between a rigid system and a flexible structure, and all the disadvantages, indeed risks, that that brings with it.



Those who are up in arms about this development have grounds for concern.

Why have these products come back on our pylons?
Do they have advantages not offered by cable-based systems?

Doubt can in fact take hold of people's minds.

But with the knowledge, experience and benefit of hindsight available to us today (to which this special issue contributes), we now know that the first criterion for guiding people's choice of a fall-arrester is the FLEXIBILITY or RIGIDITY of the structure. This choice does in fact have a rational and objective foundation ... even if the market, for its part, is not always logical.

[1] Translator's note: meaning not clear.

THE COST OF MAINTENANCE

The debate often centres on the cost of maintenance of the various systems, with the accepted wisdom being that a cable-based system is more expensive to keep up with. With cable-based systems, there are not many points that need to be checked, for it is only the anchoring of the cable which bears the stresses and strains. So it is this high component and its fastening which are principally involved in maintenance checks. The cable also needs to be monitored, principally in rigid cable systems where the fall-arrester locks by gripping the cable hard rather than by braking.

In the case of the rail-based system, there are more check points. The more fish-plate joints and anchoring points there are on the structure, the greater the maintenance. And the shorter the lengths of rail, the more fish-plate joints and anchoring points there are. Whilst, the fact of one or two bolts on a rigid tubular structure working loose may not be worrying, such an occurrence is not without risk on a flexible latticework structure, as the movements of the structure accentuate the process of bolts working loose. In the event of a fall, if two rails are badly joined together, the carriage can come away from the system. Similarly, if a point where the rail is anchored to the structure proves defective, the rail loses its rigidity. It may distort under the impact of a fall and cause the carriage to come away. Cases such as these have in fact occurred. The stakes involved in the maintenance of each joining component on a rail system are therefore far from being negligible.

MOVING ABOUT FREELY

It is essential for the comfort, and indeed the safety of the user, that the slide should be perfectly mobile. A rail made of stainless steel or aluminium keeps a smooth flat surface over a long period of time, which offers excellent operating conditions. A rail made of galvanised steel does not have these advantages. Galvanisation does indeed protect from corrosion, but it also has two disadvantages that are liable to interfere with the operation of the slide. The first is to make the surface full of lumps and bumps, as a result of being dipped in a bath of acid which pickles all the slag. The second concerns the excess thickness of zinc at the end of the rails due to runs when they are being dried vertically. This excess thickness sometimes exceeds the tolerance of the carriages. The galvanisation therefore must be in accordance with the standards and be carried out under good conditions.

Moreover, with the passage of time, the galvanisation becomes porous leaving the way open for rust to get in. So it is necessary to apply layers of protective paint. These layers, which are usually put on one on top of another, also increase the dimensions of the support hindering the working of the slide.

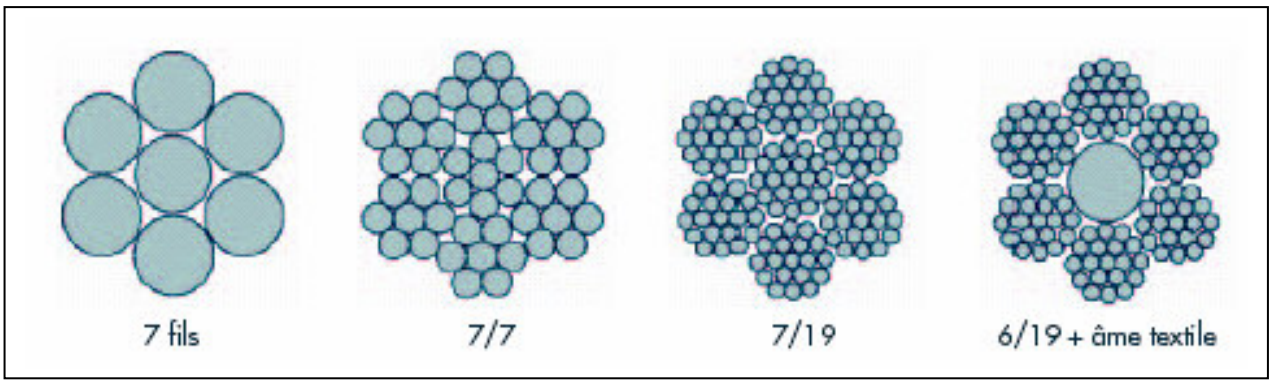
The choice of material there has an impact on the working of the system and its cost of maintenance.

THE RISKS OF SILENCE

Standard EN 353-1, entitled "Mobile fall-arrester **including** a rigid belaying support", however has dotted the eyes by specifying clearly that a fall-arrester cannot be disassociated from its support. In fact it is their respective and complementary characteristics which define the performance of the system purchased by the user.

So it is worrying to still see commercial documents remaining silent about the detailed technical characteristics of the support for their fall-arrester system. This open door is dangerous.

In the case of some cable-based fall-arresters, only the diameter of the cable is specified. This is to dangerously ignore the fact that the modulus of elasticity of a cable varies according to its make-up. For the same diameter, retailers supply 7 strand/7 wire stainless steel cable, the same in galvanised steel (modulus of 13,800 kg/mm^2), or 7 strand/19 wire galvanised steel (modulus of 13,000 kg/mm^2) or still worse 6 strand/19 wire with a textile core (modulus of 10,000 kg/mm^2). We have found installations fitted with 7 wire cable (modulus of 18,000 kg/mm^2) that is to say a difference of 80%! It is difficult to imagine that the same fall-arrester keeps its performance with such different supports. The CE mark, for its part, moreover has been given for one type of cable, the one with which the tests were carried out.



Key:

7 wire 7/7 7/19 6/19 +textile core

Take another example, that of a rail-based system for which the manufacturer recommends a "50 section" without further details. When one considers that the section is not sold by the manufacturer, but purchased separately, one begins to wonder ...

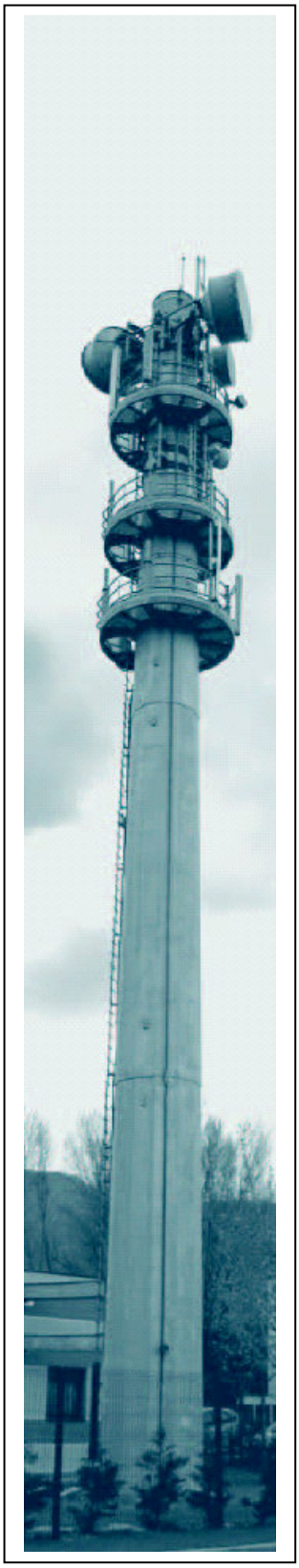
In the trade, for a 50 wide section, there are 6 standard thicknesses, from 3 to 8 mm. One also finds an IPN of 100 with a 6.8 mm thick 50 mm base, or again a 50/50 T which is 6 mm thick. Their mechanical properties are obviously not the same.

Is it down to the user to purchase a system according to his budget, as if all the alternatives did not have any effect on the working and safety of the system?

The regulations therefore are not being applied correctly and allow everyone the choice of saving money on the support, unaware of the risks. No doubt it is for this reason that some manufacturers propose putting an absorber at the head of the cable or in the link with the carriage...

How does one make sure that the user has the right slide?

BELATED REDISCOVERY....



A number of recent accidents have confirmed malfunctions in cam- or pawl-type slides that had already been revealed by a study carried out by the Centre Aeroporte de Toulouse in 1984 at the request of the INRS, the results of which have never been publicly announced. This study had been set up after it was discovered that the height of fall tended to be greater when the fall was not strictly vertical. It showed that a fall that was subject to a lateral component could unlock the cam or pawl and that the slide profited from the latency time of this kind of fall (a few fractions of a second) to set off in free fall. Whilst "waiting" for the person who was falling to catch up with the slide and cause it to lock by pivoting of the cam or pawl, the slide has gone some way and sometimes too far.

In order to provide a solution to this risk, which had been brought to light with a rope-type fall-arrester, some manufacturers have introduced a roller that exerts a slight pressure on the rope, just enough to hold the slide. Unfortunately, some manufacturers of cable- or rail-based fall-arresters only discover this unfortunate malfunction too late in the day.

The UK Government, through the Health and Safety Executive (HSE) has taken steps to tackle the problem and is currently carrying out tests and research to arrive at a better understanding of the phenomenon. The Comite European de Normalisation/European Committee for Standardisation (CEN/TC160) has been alerted and standards EN 353-1 (mobile fall-arrester including a rigid belaying support) and EN 353-2 (mobile fall-arrester including a flexible belaying support) are sure to be amended to take into account new tests and new requirements.

It should be pointed out that fall-arrester devices that operate by overspeed escape this problem.

BEING ABLE TO FORGET SAFETY

A good safety system is one which allows an operator to be able to forget his or her concerns over safety and devote himself or herself 100% to the job in hand. The mere fact of working at height gives rise to constraints. Wearing a harness for example is a constraint. Hooking oneself up to a slide can also limit a person's movements. Depending on the task in hand, mobility may become a decisive criterion, especially by allowing sufficient sideways movement over the area where work is to be carried out. Fixed supports restrict such movement, whereas flexible supports stretch to accommodate it. A good accident prevention officer will do what he or she can to reduce constraints and not add to them, whilst at the same time preserving the maximum level of safety.

TO SUM UP, A GOOD SELECTION PROCESS WILL TAKE INTO ACCOUNT:

- ☺ **the level of safety provided, its reliability and its durability,**
- ☺ **the level of mobility required,**
- ☺ **an in-depth study of the structure, leading to systems that are better adapted than others,**
- ☺ **sometimes also the weather conditions (for example in the Massif Central area of France, which in winter is swept by the "burle", latticework pylons become covered in hoar frost, access to them by staggered ladders must however be protected).**

Any comments and suggestions which readers may wish to make on this subject will be welcome. Do not hesitate to ask us questions. Send your questions to: mailto:games@gamesystem.com

RESPONSABLE

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STANDARD EN 353 -1 Rail Systems
TABLE COMPARING FALL-ARREST SYSTEMS

MANUFACTURER	PROTECTA	PROTECTA	KOMET	FROMENT
NAME OF THE PRODUCT	RAILBLOC	RAILBLOC	SECURAIL	ASRAIL
BELAYING SUPPORT				
nature	rail	rail	rail	rail
material	steel	steel	steel	steel
treatment	galvanised	stainless	galvanised	galvanised
dimension of the belaying support	standard 45 x 5 and 50 x 6	standard 45 x 5 and 50 x 6	45 x 5 or 50 x 6 or 50 x 5	standard 45 and 50
composition of the cables	not applicable	not applicable	not applicable	not applicable
INSTALLATION OF THE SUPPORT				
in lengths of	1.5m	1.5m	not marketed by KOMET	no presentation of the belaying support in the documentation
piece or upper stop	stop	stop		stop
piece or intermediate fastening	fastenings every 0.5m	fastenings every 0.5m		?
piece or lower stop	stop	stop		stop
fish-plating	between each length	between each length		between each length
tension system	none	none		none
adjustment	need for alignment	need for alignment		need for alignment
precautions	extra thickness of galvanised steel			extra thickness of galvanised steel
number of systems per installation	one per “flight” of ladders	one per “flight” of ladders		one per “flight” of ladders
possibility of change in direction	no	no		no
staggered ladders	one per stagger	one per stagger		one per stagger (?)
SLIDE				
principle	cam	cam	cam	cam
weight with connector	1800g	1800 g	1200g	1100 g
functioning	locking on d < 0.6 m	locking on d < 0.6 m	immediate locking	immediate locking
absorption of the impact	by addition of polymer energy absorber	by addition of polymer energy absorber	by addition of webbing type energy absorber (*)	by addition of webbing type energy absorber
location of the absorber	on the slide	on the slide	on the slide	on the slide
placing of the slide on the support	• by the lower end • opening version presenting possibilities of faulty locking	• by the lower end • opening version presenting possibilities of faulty locking	• by the lower end • also exists in opening version	• by the lower end
principle of movement	rolling	rolling	rolling	rolling
USE OF THE DEVICE				
possibility of user being carried off course	none	none	none	none
position by/to the user	his torso must go to the rail	his torso must go to the rail	his torso must go to the rail	his torso must go to the rail
perception by the user	rigid = safe	rigid = safe	rigid = safe	rigid = safe
use on ascent	• untimely locking as the system is installed on the ladder side	• untimely locking as the system is installed on the ladder side • better movement due to the stainless steel nature of the rail	• untimely locking • the rail reduces the useful area of the rungs of the ladder(s)	• untimely locking • the rail reduces the useful area of the rungs of the ladder(s)
use on descent	• locking if too far from the ladder • **??**	• locking if too far from the ladder	• locking if no horizontal tension	• locking if no horizontal tension
fall with lateral component	possible malfunction	possible malfunction	possible malfunction	possible malfunction
on frost-covered structure	impossible	impossible	impossible	impossible

sensitivity to the wind	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure
INSPECTION OF THE INSTALLATION				
regulations	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use
what is to be inspected?	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions • if paint: extra thickness	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions • if paint: extra thickness	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions • if paint: extra thickness
(*) Particular attention should be given to inspecting the seams of the absorber and changing it after a certain number of years (uv, ageing, loss of strength of the webbing)				

MANUFACTURER	ANTEC	BORNACK	SOLL	SOLL
NAME OF THE PRODUCT	RAILMAX		COMPACT/COMFORT	COMPACT/COMFORT
BELAYING SUPPORT				
nature	rail	rail	rail	rail
material	steel	aluminium	steel	aluminium
treatment	galvanised or stainless steel to order		galvanised	
dimension of the belaying support	40x6		specific rack-rail	specific rack-rail
imposition of the cables	not applicable	not applicable	not applicable	not applicable
INSTALLATION OF THE SUPPORT				
in lengths of	no presentation of the belaying support in the documentation 6m max.	no presentation of the belaying support in the documentation	1.2 to 4.5m max.	1.2 to 4.5m max.
piece or upper stop	stop	stop	stop	stop
piece or intermediate fastening	depends on the number of people involved	?	1.4m to 1.6m	1.4m to 1.6m
piece or lower stop	stop	stop	stop	stop
fish-plating	between each length	none, as the rails are jointed	between each length	between each length
tension system	none	none	none	none
adjustment	need for alignment	need for alignment	need for alignment	need for alignment
precautions	extra thickness of galvanised steel		extra thickness of galvanised steel	
number of systems per installation	one per flight of ladder(s)	one per flight of ladder(s)	one per flight of ladder(s)	one per flight of ladder(s)
possibility of change in direction	no	no	?	yes
staggered ladders	one per stagger	one per stagger	one per stagger with possibility of switching	one per stagger with possibility of switching
SLIDE				
principle	cam	cam	pin	pin
weight with connector	800 g	1800 g	700 g	700 g
functioning	immediate blocking	immediate blocking	14cm	14cm
absorption of the impact	by addition of webbing type energy absorber (*)	by addition of energy absorber	by addition of energy absorber	by addition of energy absorber
location of the absorber	on the slide	on the slide	on the slide	on the slide
placing of the slide on the support	by the lower end	by the lower end	by the lower end	by the lower end
principle of movement	rolling	rolling	rolling	rolling
USE OP THE DEVICE				
possibility of user being carried off course	none	none	none	none
position by/to the user	his torso must go to the rail	his torso must go to the rail	his torso must go to the rail	his torso must go to the rail
perception by the user	rigid = safe	rigid = safe	rigid = safe	rigid = safe
use on ascent	easy and restful if lengths well butted together - the rail reduces the useful area of the rungs of the ladder	easy and restful if lengths well butted together the rail reduces the useful area of the rungs of the ladder	- easy and restful if lengths well butted together - the rail reduces the useful area of the rungs of the ladder	- easy and restful if lengths well butted together - the rail reduces the useful area of the rungs of the ladder
use on descent	locking if no horizontal tension	locking if no horizontal tension	- locking if no horizontal tension on old carriage - new carriages work well	- locking if no horizontal tension on old carriage - new carriages work well
fall with lateral component	possible malfunction	possible malfunction	possible malfunction possibility of coming off the rail if substantial torsion	possible malfunction
on frost-covered structure	impossible	impossible	impossible	impossible

sensitivity to the wind	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure
INSPECTION OF THE INSTALLATION				
regulations	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use
what is to be inspected?	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions • if paint: extra thickness	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions • buckling of the rail • if paint: extra thickness	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions
(*) Particular attention should be given to inspecting the seams of the absorber and changing it after a certain number of years (uv, ageing, loss of strength of the webbing)				

STANDARD EN 353 - 1 Rail Systems
TABLE COMPARING FALL-ARREST SYSTEMS

MANUFACTURER	SOLL	BORNACK	FABA	FABA
NAME OF THE PRODUCT	COMPACT/COMFORT	RAILSTOP		
BELAYING SUPPORT				
nature	rail	rail SOLL	rail	rail
material	stainless steel		aluminium	steel
treatment				
dimension of the belaying support	specific rack-rail	specific rack-rail	specific rack-rail	specific rack-rail
composition of the cables	not applicable	not applicable	not applicable	not applicable
INSTALLATION OF THE SUPPORT				
in lengths of	1.2 to 4. 5m max.		1.1 to 5.6m	1.1 to 5.6m
piece or upper stop	stop		stop	stop
piece or intermediate fastening	1.4m to 1.6m		1.74m	1.74m
piece or lower stop	stop		stop	stop
fish-plating	between each length		between each length	between each length
tension system	none		none	none
adjustment	need for alignment		need for alignment	need for alignment
precautions				extra thickness of galvanised steel
number of systems per installation	one per flight of ladder(s)		one per flight of ladder(s)	one per flight of ladder(s)
possibility of change in direction	?		yes	?
staggered ladders	one per stagger with possibility of switching		one per stagger with possibility of switching	one per stagger with possibility of switching
SLIDE				
principle	pin	pin	pin	pin
weight with connector	700 g	890 g	1200 g	1200 g
functioning	14cm	14cm	14cm	14cm
absorption of the impact	by addition of energy absorber	by addition of energy absorber	by addition of energy absorber	by addition of energy absorber
location of the absorber	on the slide	on the slide	on the slide	on the slide
placing of the slide on the support	by the lower end	by the lower end	by the lower end	by the lower end
principle of movement	rolling	rolling	rolling	rolling
USE OF THE DEVICE				
possibility of user being carried off course	none	none	none	none
position by/to the user	his torso must be to the rail	his torso must be to the rail	his torso must be to the rail	his torso must be to the rail
perception by the user	rigid = safe	rigid = safe	rigid = safe	rigid = safe
use on ascent	• easy and restful if lengths well-butted together	• easy and restful if lengths well-butted together	• easy and restful if lengths well-butted together	• easy and restful if lengths well-butted together
	• the rail reduces the useful area of the rungs of the ladder	• the rail reduces the useful area of the rungs of the ladder • carriage works well due to the presence of ball bearings	• the rail reduces the useful area of the rungs of the ladder	• the rail reduces the useful area of the rungs of the ladder
use on descent	Locking if no horizontal tension on old carriage New carriages work well	Carriage works well due to the presence of ball bearings	Locking if no horizontal tension	Locking if no horizontal tension
fall with lateral component	Possible malfunction	Possible malfunction	Possible malfunction	Possible malfunction Possibility of coming off the
on frost-covered structure	impossible	impossible	impossible	impossible

sensitivity to the wind	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure	• slight • take wind resistance into account in calculating the structure
INSPECTION OF THE INSTALLATION				
regulations	IPE = at least once a year and + if frequent use		IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent
what is to be inspected?	• presence of upper and lower stops • rust • tightening of the nuts and bolts of fastenings and fish-plating • alignment of the rails at the junctions • buckling of the rail • if paint, extra thickness		• presence of upper and lower stops • rust • tightening of the nuts and bolts of fastenings and fish-plating • alignment of the rails at the junctions	• presence of upper and lower stops • rust • tightening of the nuts and bolts of fastenings and fish-plating • alignment of the rails at the junctions • buckling of the rail • if paint, extra thickness
(*) Particular attention should be given to inspecting the seams of the absorber and changing if after a certain number of years (uv, ageing, loss of strength of the webbing)				

STANDARD EN 353 - 1 Rail Systems
TABLE COMPARING FALL-ARREST SYSTEMS

MANUFACTURER	FABA	HACA	HACA	HACA
NAME OF THE PRODUCT				
BELAYING SUPPORT				
nature	rail	rail	rail	rail
material	stainless steel	aluminium	stainless steel	steel
treatment				
dimension of the belaying support	specific rack-rail	specific	specific	specific
composition of the cables	not applicable			
INSTALLATION OF THE SUPPORT				
in lengths of	1.1 to 5.6m	2.80m	1.96 to 5.88m	1.96 to 5.88m
piece or upper stop	stop	stop	stop	stop
piece or intermediate fastening	1.74m			
piece or lower stop	stop	stop	stop	stop
fish-plating	between each length	between each length	between each length	between each length
tension system	none	none	none	none
adjustment	need for adjustment	need for adjustment	need for adjustment	need for adjustment
precautions				
number of systems per installation	one per flight of ladders	one per flight of ladders	one per flight of ladders	one per flight of ladders
possibility of change in direction	?	?	?	?
staggered ladders	one per stagger with possibility of switching	one per stagger with possibility of switching	one per stagger with possibility of switching	one per stagger with possibility of switching
SLIDE				
principle	pin	cam	cam	cam
weight with connector	1200 g	1300 g	1300 g	1300 g
functioning	14cm	immediate locking	immediate locking	immediate locking
absorption of the impact	by addition of energy	direct	direct	direct
location of the absorber	on the slide			
placing of the slide on the support	by the lower end	by the lower end	by the lower end	by the lower end
principle of movement	rolling	rolling	rolling	rolling
USE OF THE DEVICE				
possibility of user being carried off	none	none	none	none
position by/to the user	his torso must go to the rail	his torso must go to the rail	his torso must go to the rail	his torso must go to the rail
perception by the user	rigid = safe	rigid = safe	rigid = safe	rigid = safe
use on ascent	easy and restful if lengths well-butted together	easy and restful if lengths well-butted together	easy and restful if lengths well-butted together	easy and restful if lengths well-butted together
	the rail reduces the useful area of the rungs of the ladder	the rail reduces the useful area of the rungs of the ladder	the rail reduces the useful area of the rungs of the ladder	the rail reduces the useful area of the rungs of the ladder
use on descent	locking if no horizontal tension			
fall with lateral component	possible malfunction possibility of coming off the rail if substantial torsion			
on frost-covered structure	impossible			

sensitivity to the wind	slight			
	take wind resistance into account in calculating the structure			
INSPECTION OF THE INSTALLATION				
regulations	IPE = at least once a year and + if frequent use			
what is to be inspected?	• presence of upper and lower stops • rust • tightening of the nuts and bolts of the fastenings and fish-plating • alignment of the rails at the junctions			
(*) Particular attention should be given to inspecting the seams of the absorber and changing it after a certain number of years (uv, ageing, loss of strength of the webbing)				

STANDARD EN 353 - 1 Rigid cable systems
TABLE COMPARING FALL-ARREST SYSTEMS

MANUFACTURER	PROTECTA	FROMENT	KOMET	ANTEC
NAME OF THE PRODUCT	CABLOC	ASCAB	KM CABLE	SKC
BELAYING SUPPORT				
nature	8 mm diam. cable	8 mm diam. cable	8 mm diam. cable	8 mm diam. cable
material	steel	no presentation of the belaying support in the documentation	no presentation of the belaying support in the documentation	no presentation of the belaying support in the documentation
treatment	stainless steel or galvanised steel	stainless steel or galvanised steel	stainless steel	stainless steel or galvanised steel
dimension of the belaying support	8 mm	8 mm	8 mm	8mm
composition of the cables	7 x 19 or 6 x 19 + textile core		7x19	7 x 19 or 6 x 19 + textile core
INSTALLATION OF THE SUPPORT				
in lengths of	on the side of each flight of ladder(s)	on the side of each flight of ladder(s)	on the side of each flight of ladder(s)	on the side of each flight of ladder(s)
piece or upper stop	anchoring piece	anchoring piece	anchoring piece	anchoring piece
piece or intermediate fastening	intermediate pieces every 10 m.	intermediate pieces every 10m.	intermediate pieces every 10m.	intermediate pieces every 10m.
piece or lower stop	anchoring	anchoring	anchoring	anchoring
fish-plating	none	none	none	none
tension system	tensioner	tensioner	tensioner	tensioner
adjustment	none : self-aligning	none : self-aligning	none self-aligning	none : self-aligning
precautions	on unwinding : kinks	on unwinding : kinks	on unwinding : kinks	on unwinding : kinks
number of systems per installation	one per flight of ladder(s)	one per flight of ladder(s)	one per flight of ladder(s)	one per flight of ladder(s)
possibility of change in direction	no	no	no	no
staggered ladders	one per stagger	one per stagger	one per stagger	one per stagger
SLIDE				
principle	cam	cam	cam	cam
weight with connector	690 g	900 g	600 g	600 g
functioning	immediate locking	immediate locking	immediate locking	immediate locking
absorption of the impact	by addition of energy absorber	by addition of energy absorber	by addition of energy absorber	without absorber
location of the absorber	at head of cable made of	on the slide webbing type	on the slide webbing type	no
placing of the slide on the support	doesn't matter	doesn't matter	doesn't matter	doesn't matter
principle of movement	friction	friction	friction	friction
USE OF THE DEVICE				
possibility of user being carried off course	none possible in middle of span	none possible in middle of span	none possible in middle of span	none possible in middle of span
position by/to the user	his torso must go to the cable	his torso must go to the cable	his torso must go to the cable	his torso must go to the cable
perception by the user	8 mm = safe	8 mm = safe	8 mm = safe	8 mm = safe
use on ascent	easy, cable has to be released at the intermediate piece or fastening	easy, cable has to be released at the intermediate piece or fastening	easy, cable has to be released at the intermediate piece or fastening	easy, cable has to be released at the intermediate piece or fastening
use on descent	Locking if the fall-arrester is situated above or on a level with the point where The harness is hooked up the cable has to be put back in the intermediate piece or fastening	Locking if the fall-arrester is situated above or on a level with the point where the harness is hooked up The cable has to be put back in the intermediate piece or fastening	Locking if the fall-arrester is situated above or on a level with the point where the harness is hooked up The cable has to be put back in the intermediate piece or fastening	Locking if the fall-arrester is situated above or on a level with the point where the harness is hooked up The cable has to be put back in the intermediate piece or fastening
fall with lateral component	not known	not known	not known	not known
on frost-covered structure	difficult	difficult in the case of a system with low tension	difficult in the case of a system with low tension	difficult in the case of a system with low tension

sensitivity to the wind	Slight Keep an eye on the number of intermediate pieces	Slight Keep an eye on the number of intermediate pieces	Slight Keep an eye on the number of intermediate pieces	Slight Keep an eye on the number of intermediate pieces
INSPECTION OF THE INSTALLATION				
regulations	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use
what is to be inspected?	• tightening of the upper and lower nuts and bolts • state of the cable (wires cut, crushing) • rust in the case of galvanised steel cable • cable or talurit (?) • cable wear at the intermediate • tension of the cable	• tightening of the upper and lower nuts and bolts • state of the cable (wires cut. crushing) • rust in the case of galvanised steel cable • cable or talurit (?) • cable wear at the intermediate tension of the cable	• tightening of the upper and lower nuts and bolts • state of the cable (wires cut, crushing) • cable or talurit (?) • cable wear at the intermediate • tension of the cable	• tightening of the upper and lower nuts and bolts • state of the cable (wires cut, crushing) rust in the case of galvanised steel cable • cable or talurit (?) • cable wear at the intermediate • tension of the cable
	• absorber • if the lower anchoring point is not on the structure, but in the concrete, a special inspection needs to be carried out into the wear at the junction between upper piece and cable (often a simple karabiner)	• if the lower anchoring point is not on the structure, but in the concrete, a special inspection needs to be carried out into the wear at the junction between upper piece and cable (often a simple karabiner)	• if the lower anchoring point is not on the structure, but in the concrete, a special inspection needs to be carried out into the wear at the junction between upper piece and cable (often a simple karabiner)	• if the lower anchoring point is not on the structure, but in the concrete, a special inspection needs to be carried out into the wear at the junction between upper piece and cable (often a simple karabiner)
(*) Particular attention should be given to inspecting the seams of the absorber and changing it after a certain number of years (uv, ageing, loss of strength of the webbing)				

MANUFACTURER	GAMESYSTEM	PROTECTA	
MAME OF THE PRODUCT	PAPILLON	CABLOC	
BELAYING SUPPORT			
nature	5 mm diam. cable	8 mm diam. cable	
material	steel	steel	
treatment	stainless steel	stainless steel and	galvanised steel
dimension of the belaying support	5mm	8 mm	
composition of the cables	7x19	7 x 19	or 6 x 19 + textile core
INSTALLATION OF THE SUPPORT			
in lengths of	of the installation	flight of ladder(s)	
piece or upper stop	anchoring piece	anchoring piece	
piece or intermediate fastening	intermediate pieces every 5 m	intermediate pieces every 5 m	
piece or lower stop	lower piece	lower piece	
fish-plating	none	none	
tension system	7 kg counterweight	7 kg counterweight	
adjustment	none : self-aligning	none : self-aligning	
precautions	on unwinding : kinks	on unwinding : kinks	
number of systems per installation	one per installation	one per flight	
possibility of change in direction	yes	no	
staggered ladders	a single system	a single system	
SLIDE			
principle	V-grooved pulley	cam	
weight with connector	1100g	600g	
functioning	locking of the pulley + sliding	immediate locking	
absorption of the impact	sliding in the groove of the pulley	by addition of energy absorber	
location of the absorber	not needed; included within the principle of the device	at head of cable	
placing of the slide on the support	doesn't matter	doesn't matter	
principle of movement	rolling	friction	
USE OF THE DEVICE			
possibility of user being carried off course	yes	yes	
position by/to the user	the cable comes to him	the cable comes to him	
perception by the user	flexible + 5 mm = strength?	flexible therefore no support	
use on ascent	easy, the cable has to be released at the intermediate pieces or fastenings	easy, the cable has to be released at the intermediate pieces or fastenings	
use on descent	free the cable has to be put back in the intermediate pieces or fastenings	free the cable has to be put back in the intermediate pieces or fastenings	
fail with lateral component	malfunction impossible	malfunction possible stopping in several stages	
on frost-covered structure	easy, as the cable can be shaken	easy, as the cable can be shaken	
sensitivity to the wind	The pitch between intermediate pieces must be reduced in windswept areas	The pitch between intermediate pieces must be reduced in windswept areas	
INSPECTION OF THE INSTALLATION			
regulations	IPE = at least once a year and + if frequent use	IPE = at least once a year and + if frequent use	
what is to be inspected?	• tightening of the upper nuts and bolts • state of a cable (cut wires) • cable for old installations • cable wear at the intermediates	• tightening of the upper nuts and bolts • state of a cable (cut wires) • cable wear at the intermediates	

This table is a snapshot at a given moment of the main types of equipment currently available on the market. It has been drawn up from the commercial documentation and directions for use supplied by the manufacturers. We hope to enrich it with your experiences. Please contact us on our site: games@gamesystem.com