



Centro Studi Materiali e Tecniche



*I materiali per
l'alpinismo e
l'arrampicata*

===

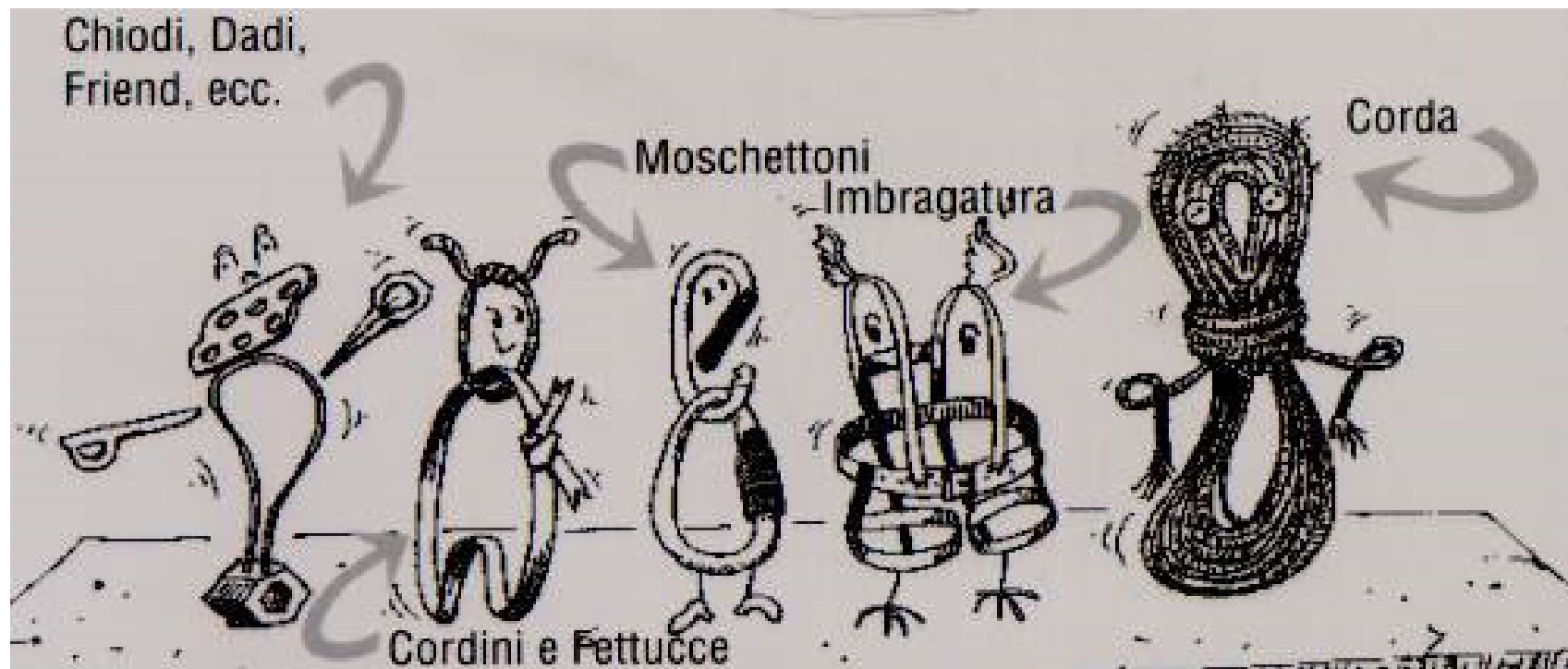
Le norme relative



La *catena di assicurazione*

E' composta da tutti gli elementi che nel loro insieme concorrono alla sicurezza della cordata in caso si verifichi una caduta

Gli elementi essenziali della C.A. sono:





Obiettivi della *Catena di Assicurazione*

ridurre al minimo i danni

↪ *sia a chi assicura*

↪ *sia a chi cade*





LA SICUREZZA DI UNA

"CATENA DI ASSICURAZIONE"

E' PARI ALLA SICUREZZA (tenuta)

DEL SUO COMPONENTE PIU' DEBOLE

Materiali

**Funzionalità per la
progressione**

Sicurezza

**Principale causa di
pericolo durante la
progressione tecnica
in montagna**

La caduta



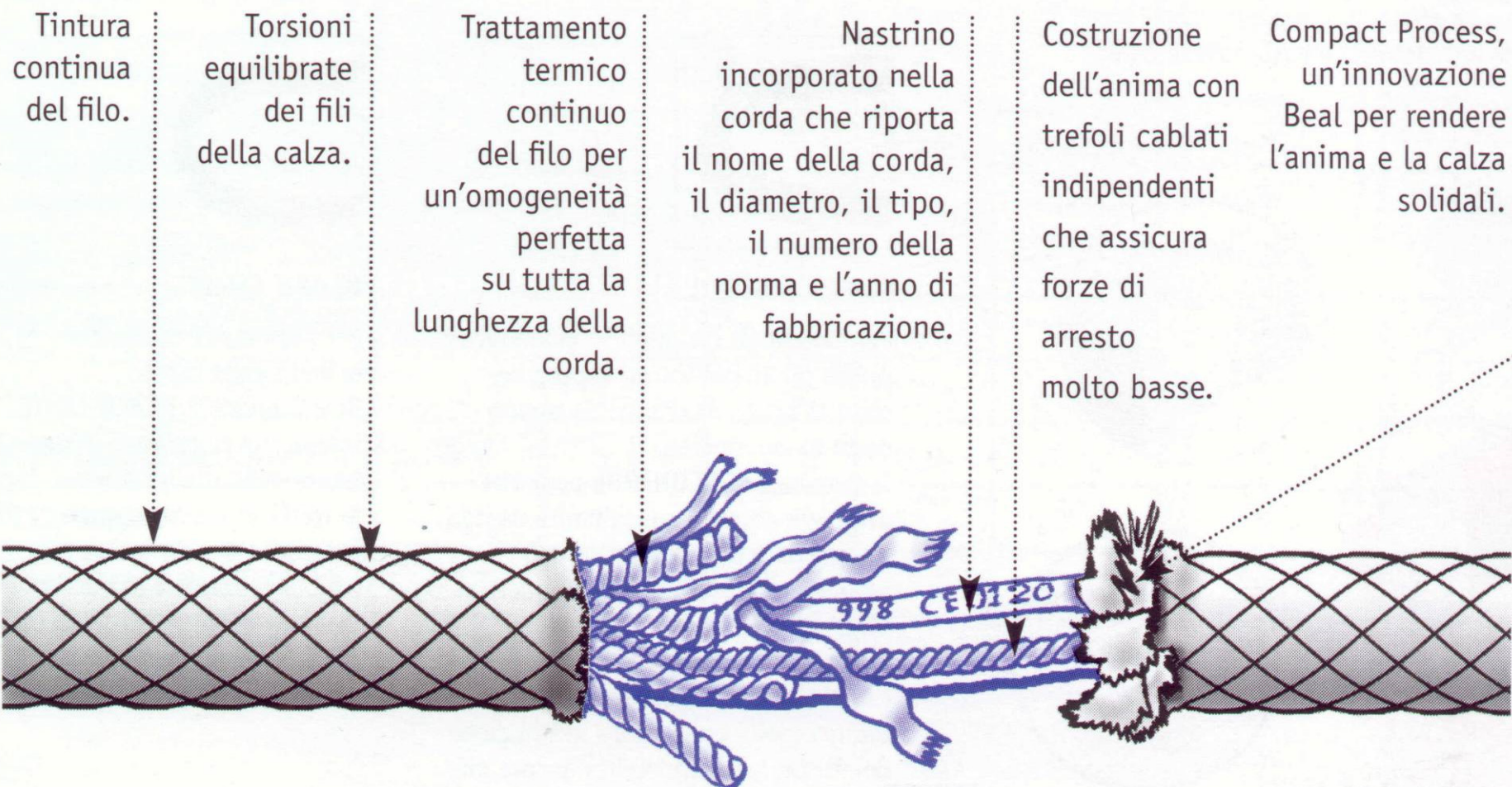


Corde

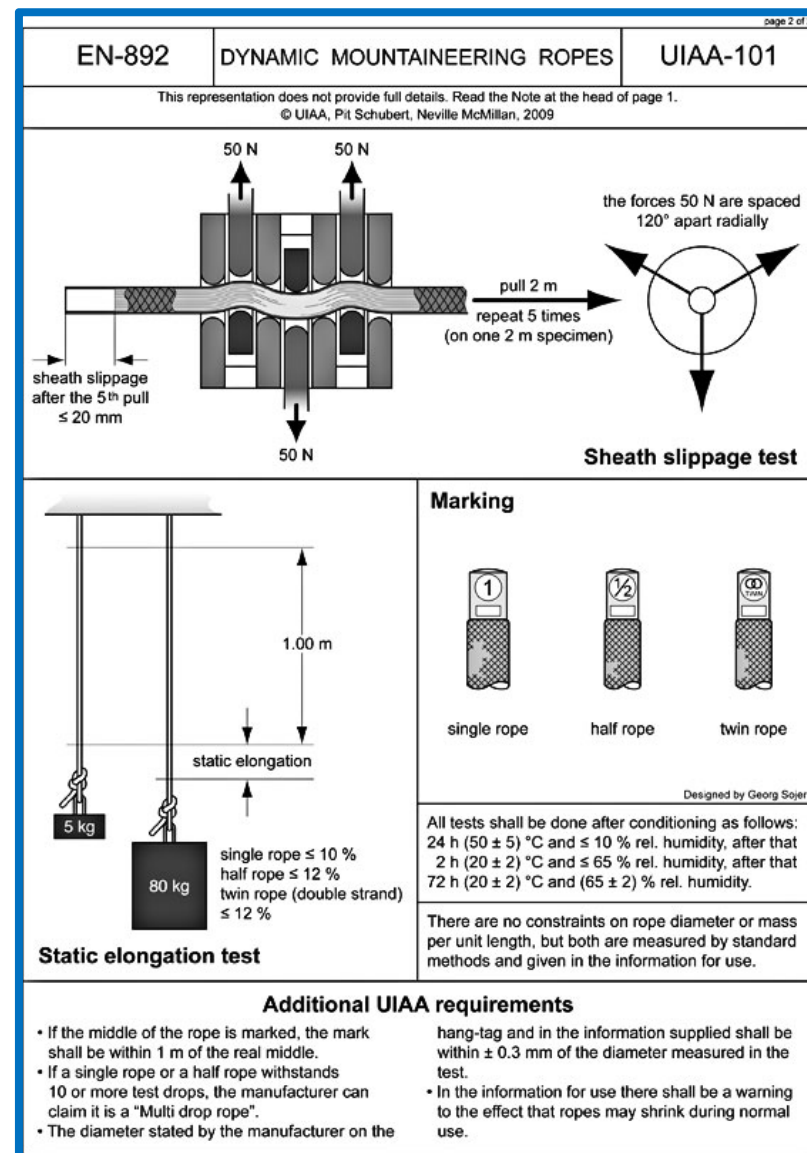
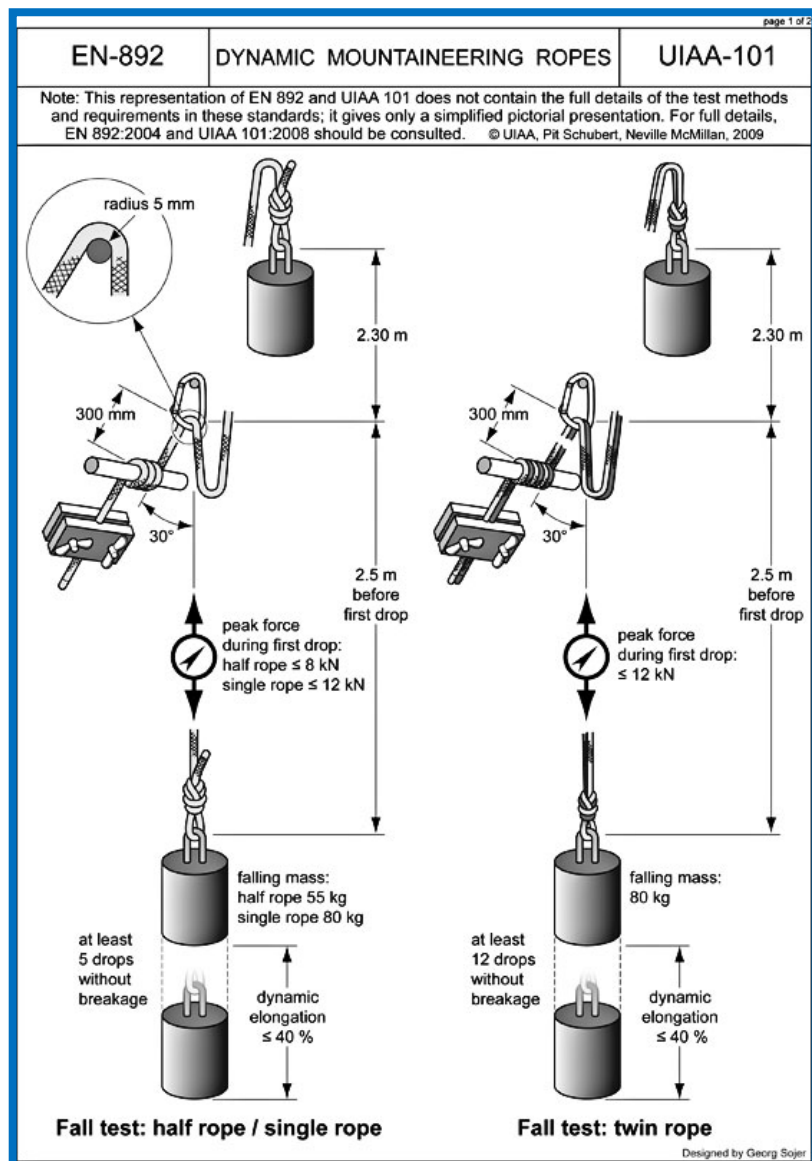
CE EN 892

***Corda dinamica per alpinismo:**
corda in grado di arrestare la
caduta libera di una persona -
**impegnata in una azione di
alpinismo o in una scalata -**
con una forza di arresto limitata*

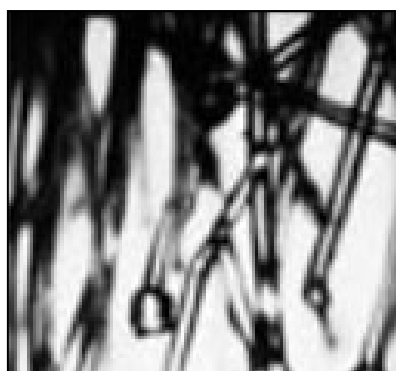
Caratteristiche costruttive di una corda “moderna”



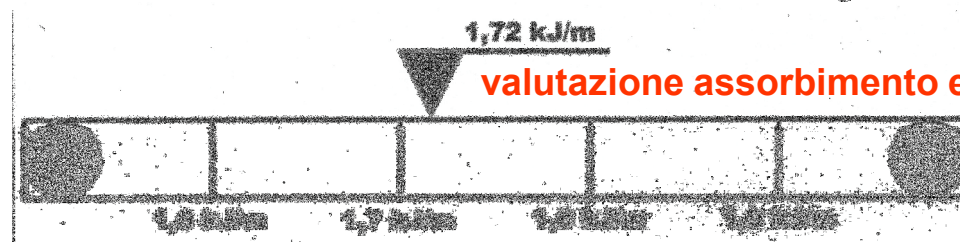
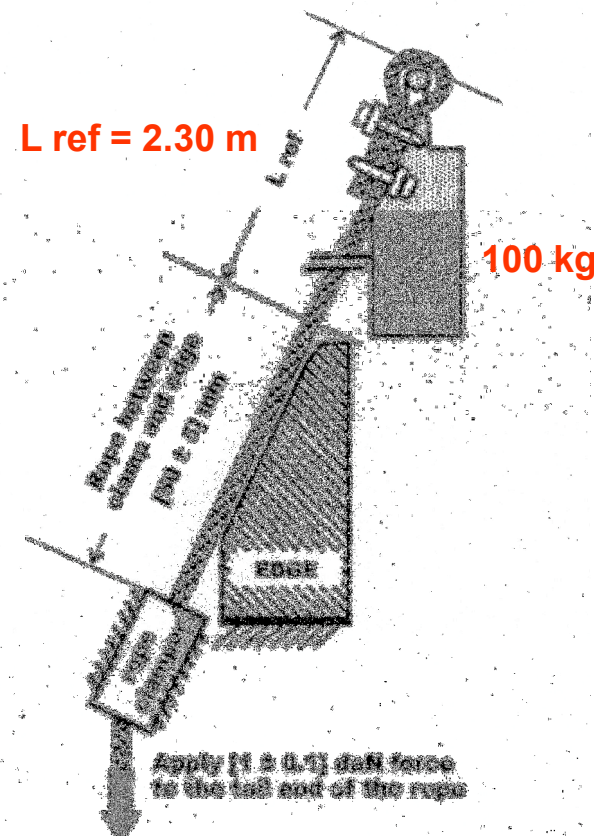
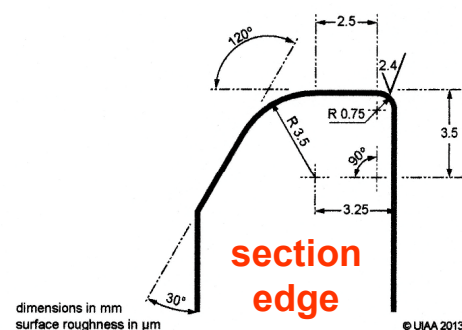
Il pittogramma della norma EN 892



EFFETTO SPIGOLO SULLE CORDE



Il metodo di prova proposto dal CSMT, basato sulla energia assorbita dalla corda fino al momento della rottura, è stato approvato a livello UIAA.





CORDE: NORME UIAA-EN



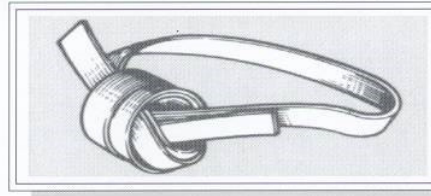
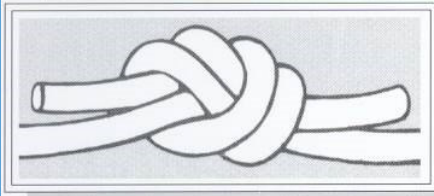
- **Corde:**
 - Singole
 - Mezze
 - Gemellari
- Prove “dinamiche” al Dodero:

Tipo corda	Massa (kg)	Fa (kN)	Num. Cad.	All. Statico
Singola	80	12	5	10 %
Mezza	55	8	5	12 %
Gemellari	80	12	12	10 %

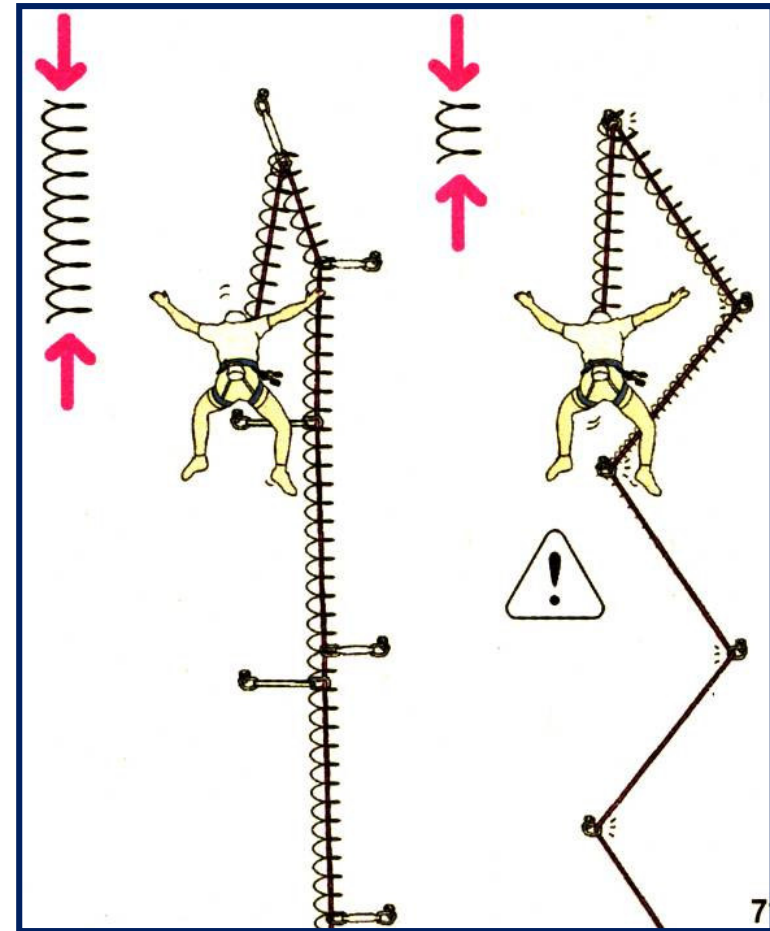
- **Altri test:**
 - Allungamento (10% singole e gemellari, 12% mezze)
 - Scorrimento calza
 - Annodabilità

Cordini e fettucce

Elementi che hanno come scopo quello di permettere un ottimale scorrimento della corda.
Non contribuiscono all'assorbimento di energia.

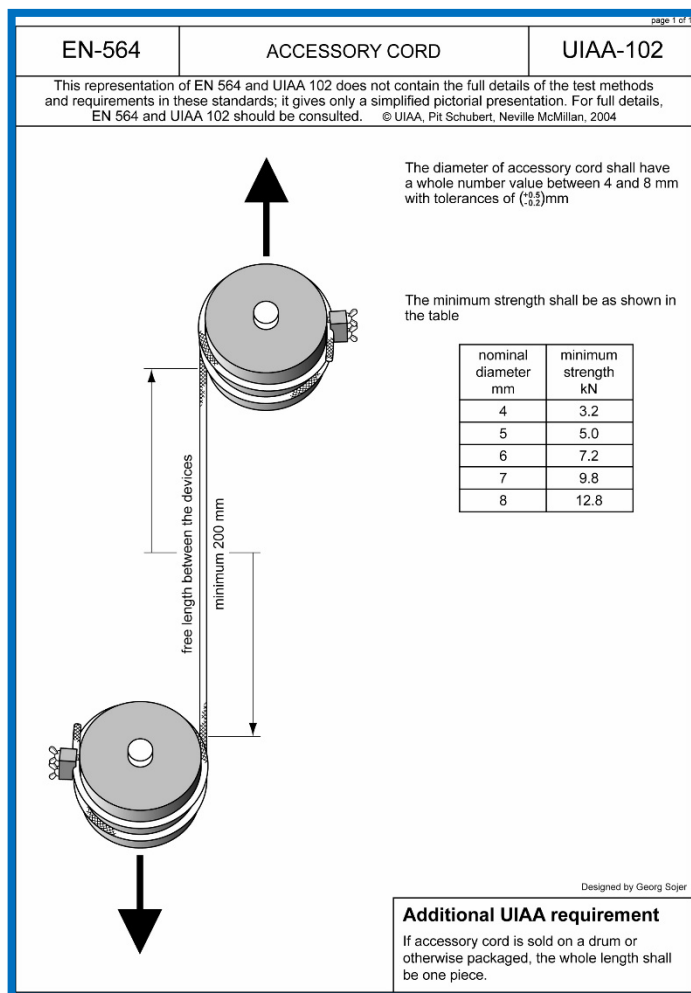


**vengono
caratterizzati
mediante il loro
carico di rottura
statico**





CORDINO è costituito da un'anima rivestita da una guaina (diametro nominale tra 4 e 8 mm) - destinato a resistere a forze, ma non ad assorbire energia



Diametro Nominale [mm]	Resistenza Minima [daN]
4	320
5	500
6	720
7	980
8	1280

Per il nylon

$$R_{\min} [\text{daN}] = D [\text{mm}]^2 \times 20$$

le Norme non contemplano materiali diversi dal nylon e non tengono conto di effetti di intaglio



CARICO DI ROTTURA

	D	R _{rott.}
nylon asciutto	7	1360
nylon bagnato	7	1160
nylon asciutto	5	678
nylon asciutto	4	423
kevlar	5,5	1940
dyneema	5,5	1977



KEVLAR



- **fibra sintetica di recente tecnologia e chimicamente simile al nylon**
- **caratteristiche fisico-meccaniche superiori (resistenza rottura maggiore di 3 - 4 volte)**
- **diametro di 5,5 o 6 mm carico di rottura di ~ 1800 daN**
- ***costruzione:***
 - calza di nylon 6 (tubolare)
 - anima di Kevlar di colore giallo (costituita da 17 trefoli intrecciati assieme, ogni trefolo è composto da 5 stoppini)

DYNEEMA

- **fibra sintetica, polietilenica**
- **caratteristiche fisico-meccaniche notevoli (maggiori del Kevlar)**
- **diametro di 5,5 e carico di rottura di ~ 1800 daN**

Fettuccia banda lunga, stretta e piatta che presenta una struttura tessile destinata a resistere alle forze statiche ma non ad assorbire energia dinamica

CE EN 565

Anello fettuccia cordino o corda uniti mediante cucitura o altro mezzo di chiusura - forma e lunghezza non sono specificate

CE EN 566

Il carico minimo di rottura deve essere almeno di 22 KN e deve essere marcato sul preparato.

FILI SPIA SULLE FETTUCCE

(500 daN x filo spia)



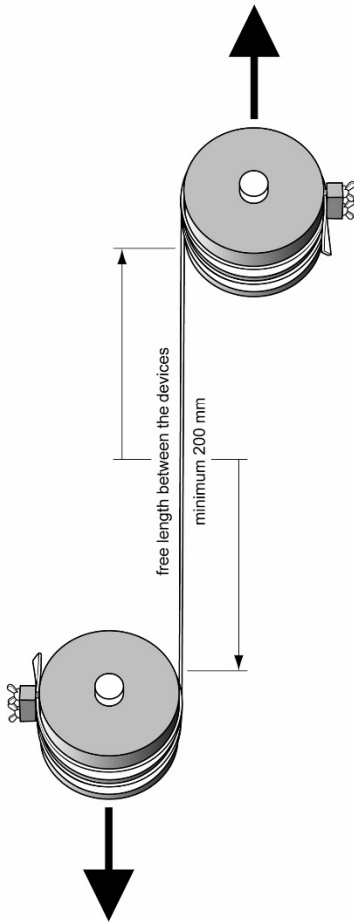
64

Il pittogramma della norma EN 566

page 1 of 1

EN-565	TAPE	UIAA-103
--------	------	----------

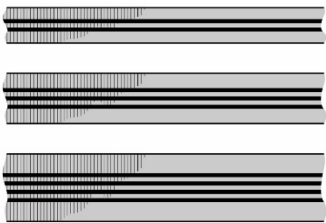
This representation of EN 565 and UIAA 103 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 565 and UIAA 103 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004



Any cross section of tape is possible. The strength shall be marked with stripes on one side of the tape (see below) in accordance with the table

number of stripes	minimum strength kN
1	5.0
2	10.0
3	15.0
4	20.0

In general only the tape with 3 stripes is usual.



Marking with stripes (on one side of the tape)

Designed by Georg Sojer

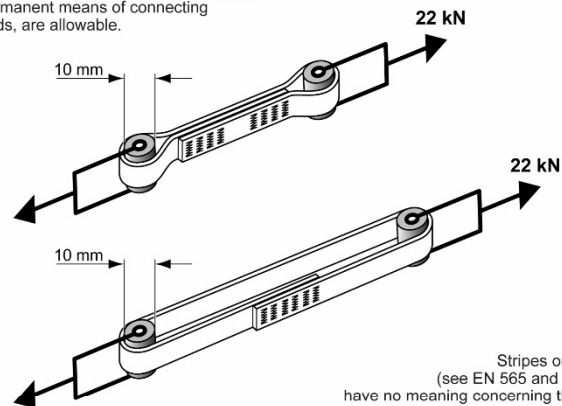
Additional UIAA requirement
If tape is sold on a drum or otherwise packaged, the whole length shall be one piece.

page 1 of 1

EN-566	SLINGS	UIAA-104
--------	--------	----------

This representation of EN 566 and UIAA 104 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 566 and UIAA 104 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004

Any kind of sling, and any form of sling closure, and any permanent means of connecting the tape ends, are allowable.



Stripes on the tape (see EN 565 and UIAA 103) have no meaning concerning the strength

Additional UIAA requirement
If slings are made from tape by stitching the tape, at least 50% of the visible area of stitching shall contrast with the tape in colour.

Designed by Georg Sojer





CE EN 12277



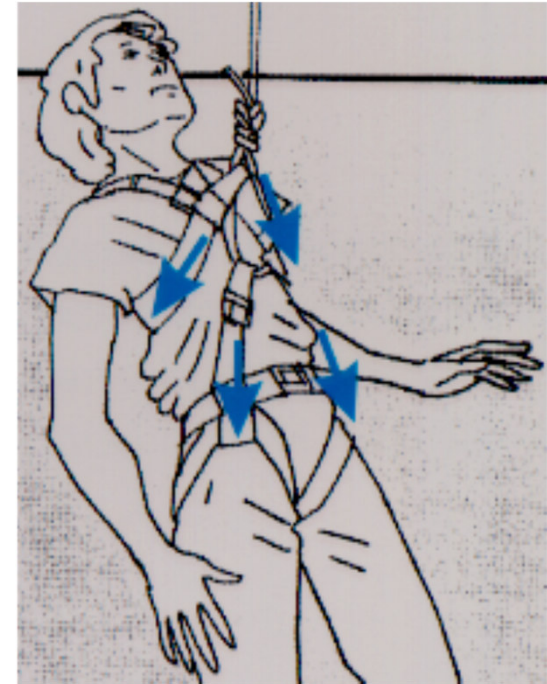
IMBRACATURE



l'imbracatura

**NON CONTRIBUISCE A RIDURRE
LA DECELERAZIONE SUBITA**

ma



- mantiene la corretta posizione in fase di decelerazione
- ripartisce la **Forza d'Arresto** in modo razionale e non traumatico

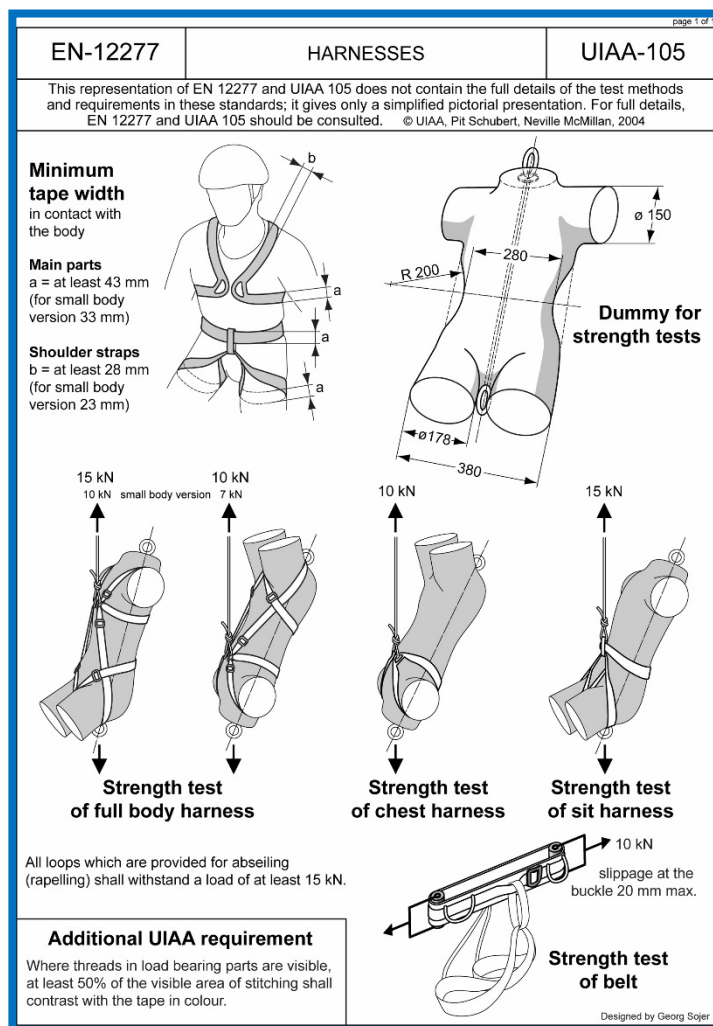
Lo sforzo massimo in gioco in una caduta è di 1200 daN:
equivalente a 15 volte l'accelerazione di gravità ($g = 9.81 \text{ m/s}^2$)
applicata ad una massa di 80 kg.



Funzioni richieste

- 1 Trasmissione della forza di arresto
- 2 Sospensione indolore del corpo
- 3 Forma imbragatura idonea:
 - alla corretta posizione nella caduta
 - al rispetto delle zone delicate del corpo
 - alla non fuoriuscita del corpo
 - alla libertà di movimento
 - all'indossabilità e regolabilità

Il pittogramma della norma EN 12277





imbracatura completa

Salewa

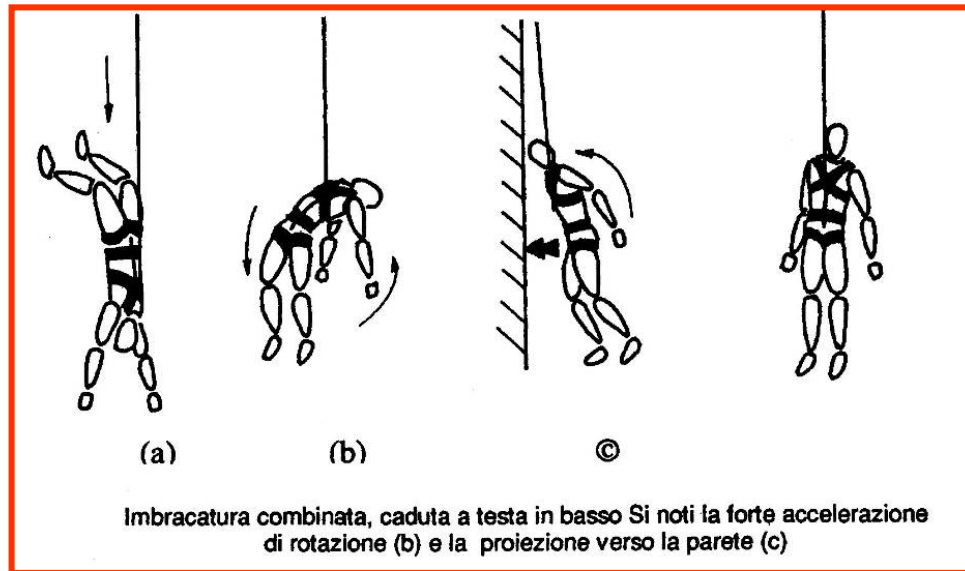
(norma EN = 1600 kg)

rottura cucitura
anello = 1641 kg

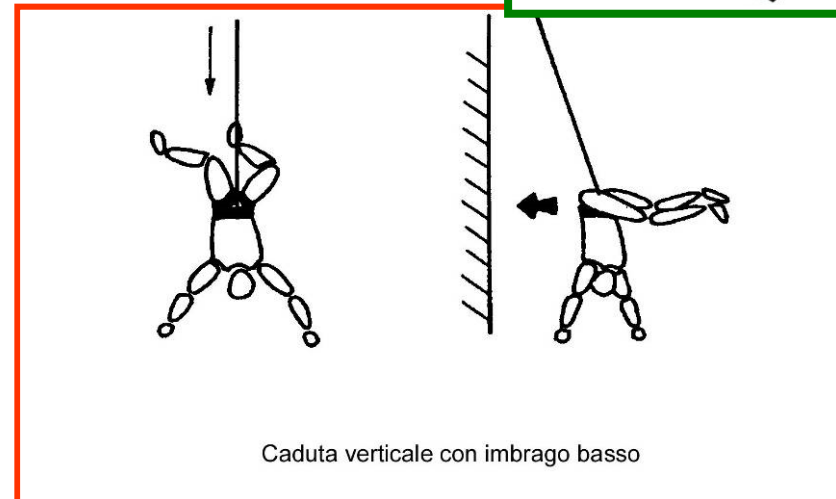
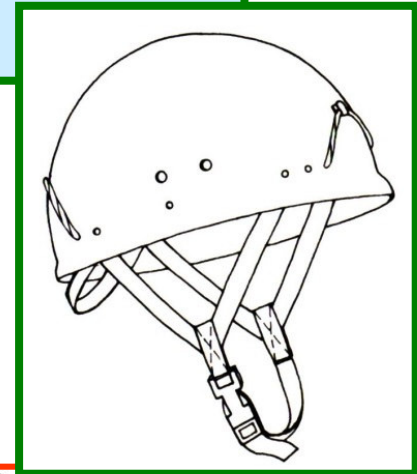
rottura cucitura
anello = 1650 kg

rottura fettuccia
cosciale = 2500 kg

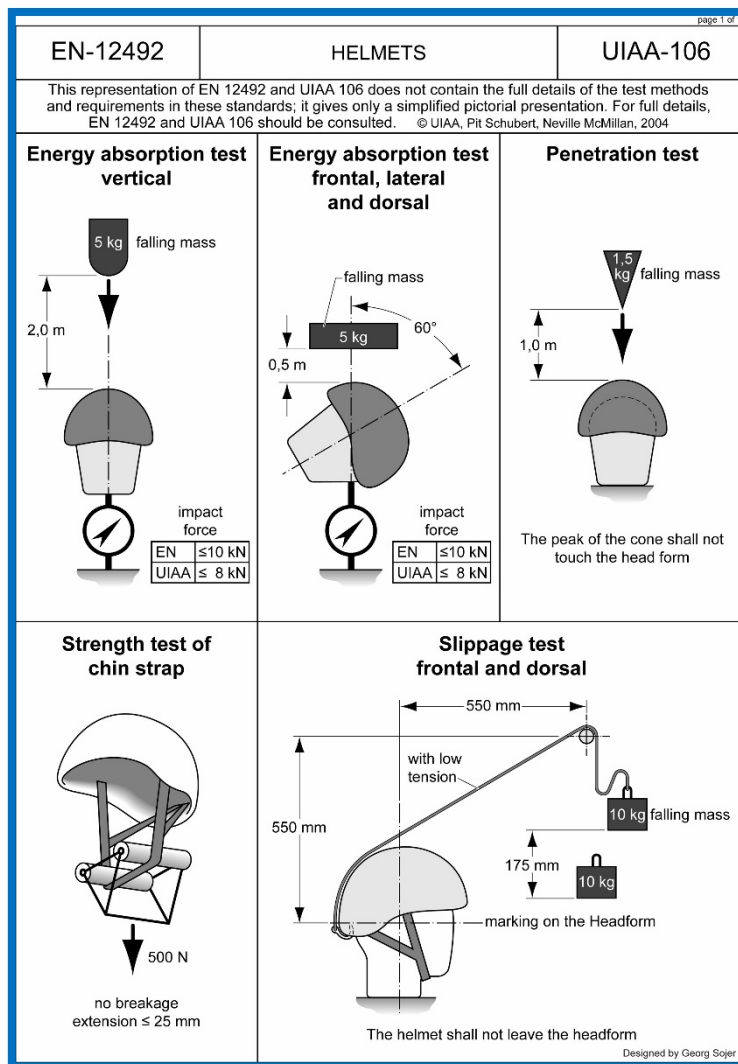
Il CASCO non serve solo per proteggerci dalla caduta di sassi od oggetti
perché
qualsiasi tipo di imbracatura si usi c'è sempre il rischio di urtare la testa contro la parete !!!



CE EN 12492



Il pittogramma della norma EN 12492



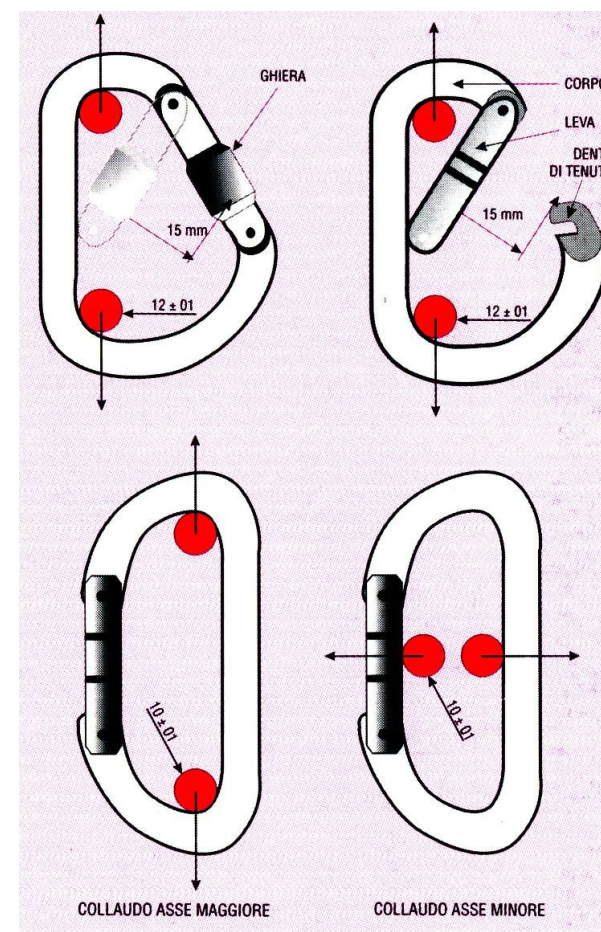
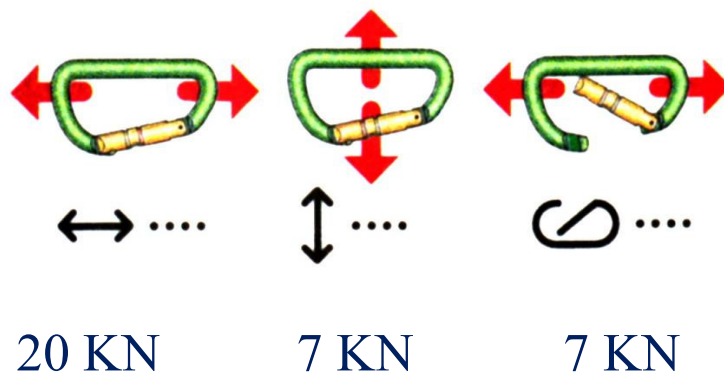


I moschettoni o connettori



Connettore è un dispositivo apribile che permette all'alpinista di collegarsi direttamente o indirettamente ad un ancoraggio

CE EN 12275



CONNETTORI = MOSCHETTONI



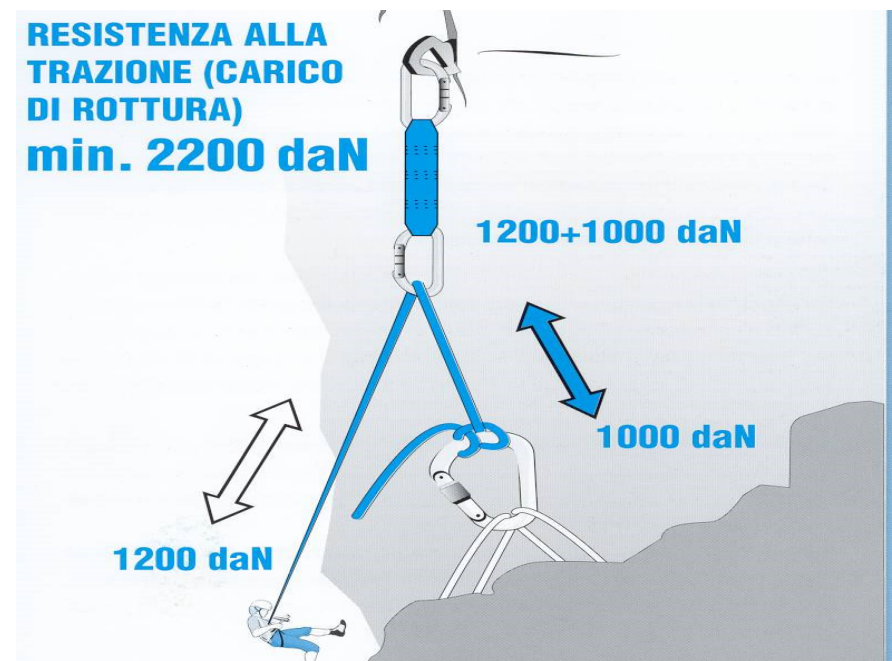
leghe di alluminio allo
zinco-rame-magnesio

il valore della resistenza a rottura

rappresenta il **carico a rottura** applicato al rinvio - in caso di caduta - ed è ricavato dalla sommatoria di due contributi:

- **forza di arresto** restituita dal ramo di corda collegato all'alpinista = con corda EN a **1200 daN max**
- **forza di arresto** restituita dal ramo di corda che dal rinvio torna alla sosta (1200 daN) = valore ridotto a **1000 daN** causa dei fenomeni di attrito dovuti allo scorrimento (15%)

➔ **2200 daN**



Il pittogramma della norma EN 12275

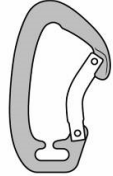
EN-12275 CONNECTORS UIAA-121

This representation of EN 12275 and UIAA 121 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 12275 and UIAA 121 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004

The general term "Connectors" is used to include all types of karabiners and also quicklinks ("Maillon rapide").



Type B (Basic)
Connector for normal use



Type D (directional)
Connector for Quickdraws



Type X (oval shape)
Connector for Aid climbing



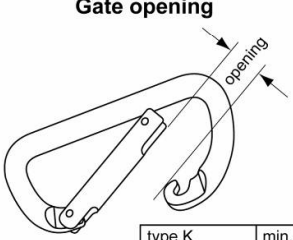
Type H (HMS)
Connector for belaying



Type K (Klettersteig)
Connector for "Via ferrata", "Klettersteig"
Type K Connectors shall have an automatic locking device

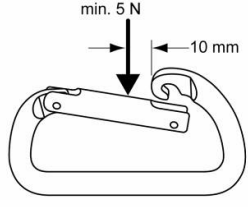


Type Q (Quick link)
Connector for extra safety Quick link, "Maillon rapide"



Gate opening

type K	min. 21 mm
all other types	min. 15 mm



Gate opening force
(for all types)

min. 5 N

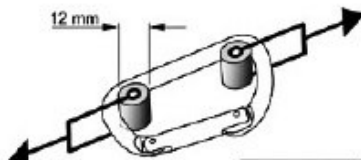
10 mm

Designed by Georg Sojer

EN-12275 CONNECTORS UIAA-121

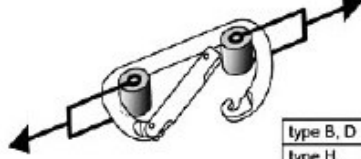
This representation does not provide full details. Read the Note at the head of page 1.
© UIAA, Pit Schubert, Neville McMillan, 2009

Strength in main direction



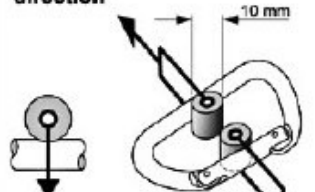
type K, Q	25 kN
type X	18 kN
all other types	20 kN

Gate-open strength



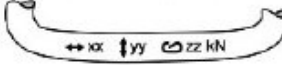
type B, D	7 kN
type H	6 kN
type X	5 kN
type K	8 kN
type Q	—

Strength in transverse direction



type Q	10 kN
type B, H, K, X	7 kN
type D, K/D	—

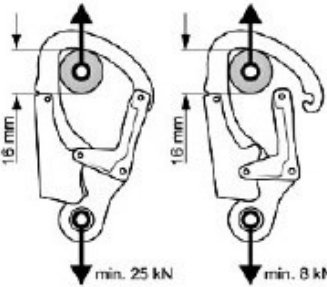
Marking of strength (in kN)



strength	
xx	in main direction
yy	in transverse direction
zz	gate-open

Additional UIAA requirements only for type K (Klettersteig, "via ferrata")

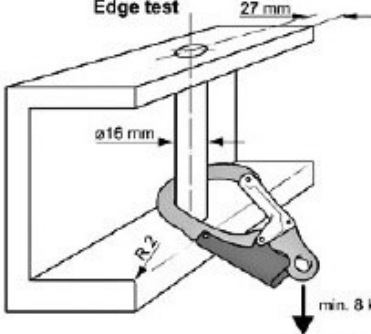
Major axis tests



min. 25 kN

min. 8 kN

Edge test



27 mm

ø16 mm

R2

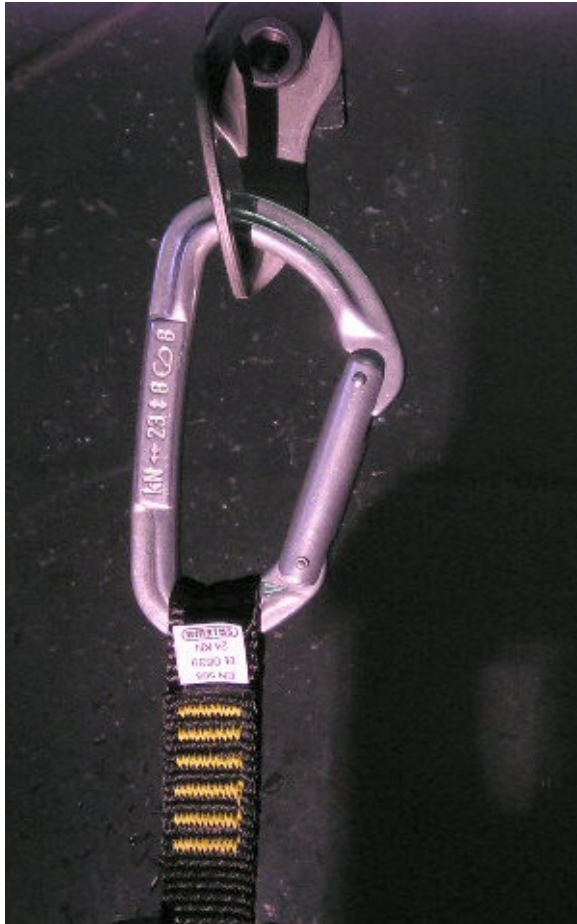
min. 8 kN

Designed by Georg Sojer



Rottura Connettori

(corrispondente al test Salewa)



2241 daN



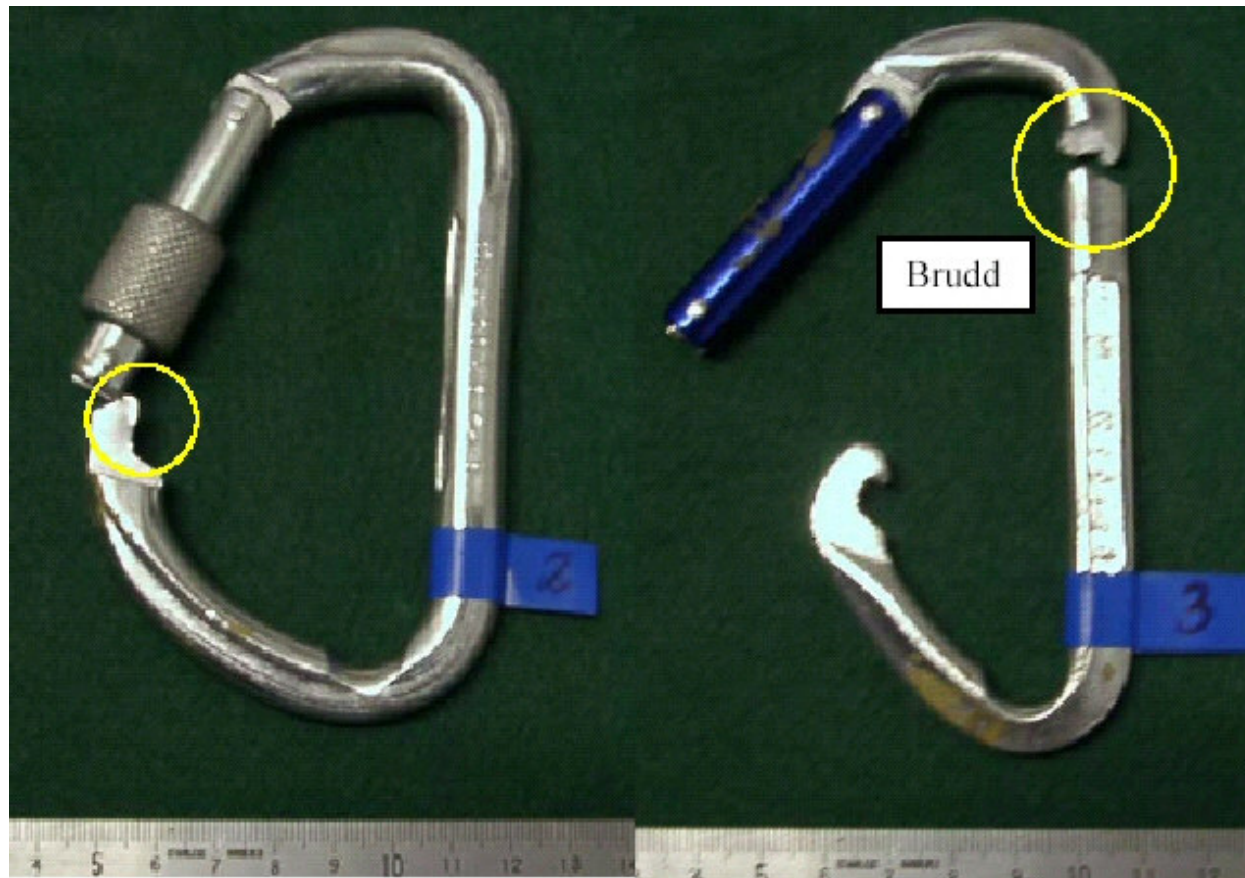
804 daN



226 daN

Rottura Connettori

Worn-down carabiners from indoor gym tested to failure



• 2,9 mm

• 41 kN

• 2,3 mm

• 27 kN

.0000 sec

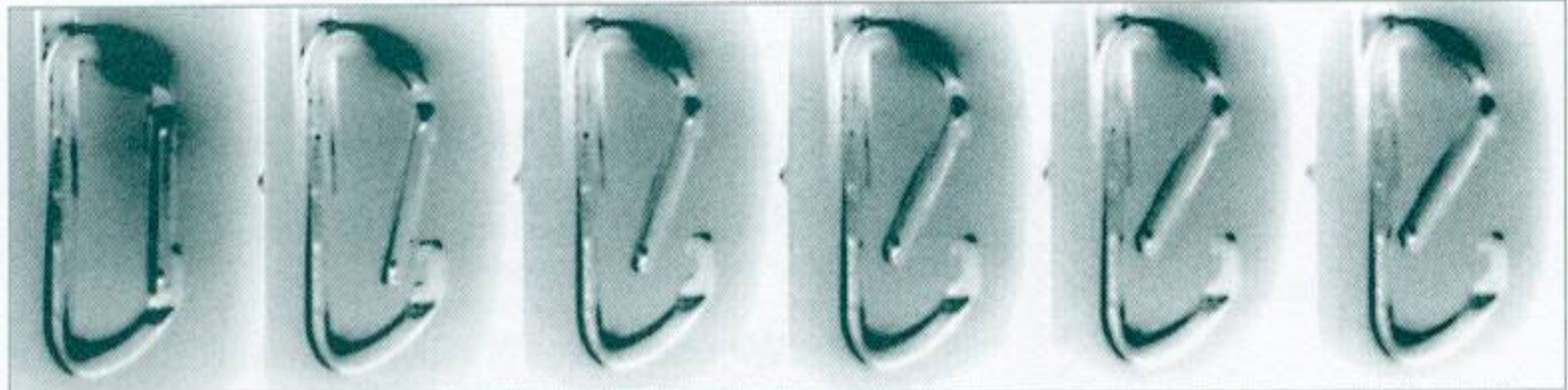
.0005 sec

.0010 sec

.0015 sec

.0020 sec

.0025 sec



moschettone standard

l'effetto *whiplash*

moschettone "wiregate"

.0000 sec

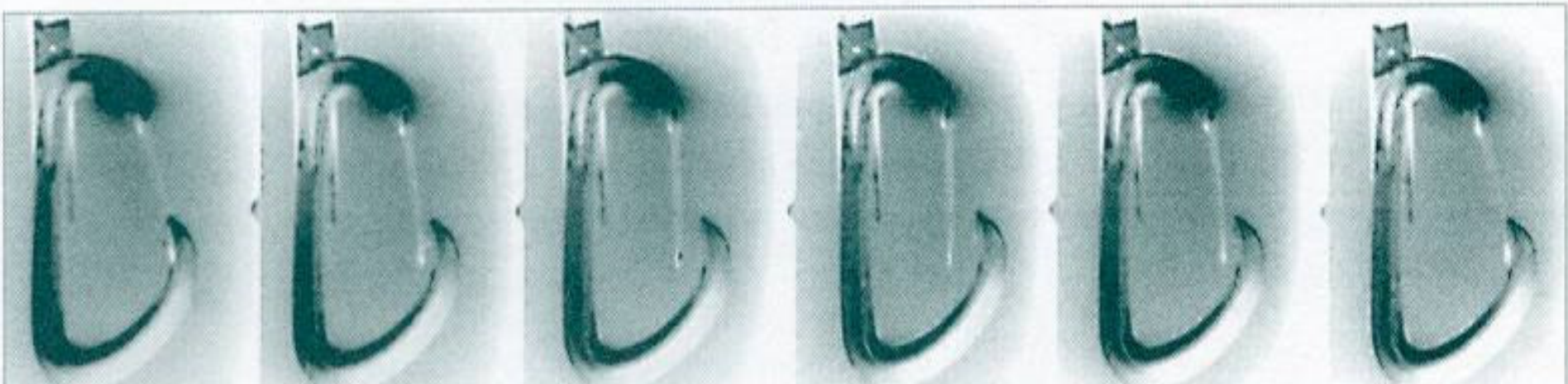
.0005 sec

.0010 sec

.0015 sec

.0020 sec

.0025 sec



- 1 corda inserita in modo errato nel moschettone rispetto alla direzione di chi arrampica

(in caso di volo la corda può fuoriuscire)

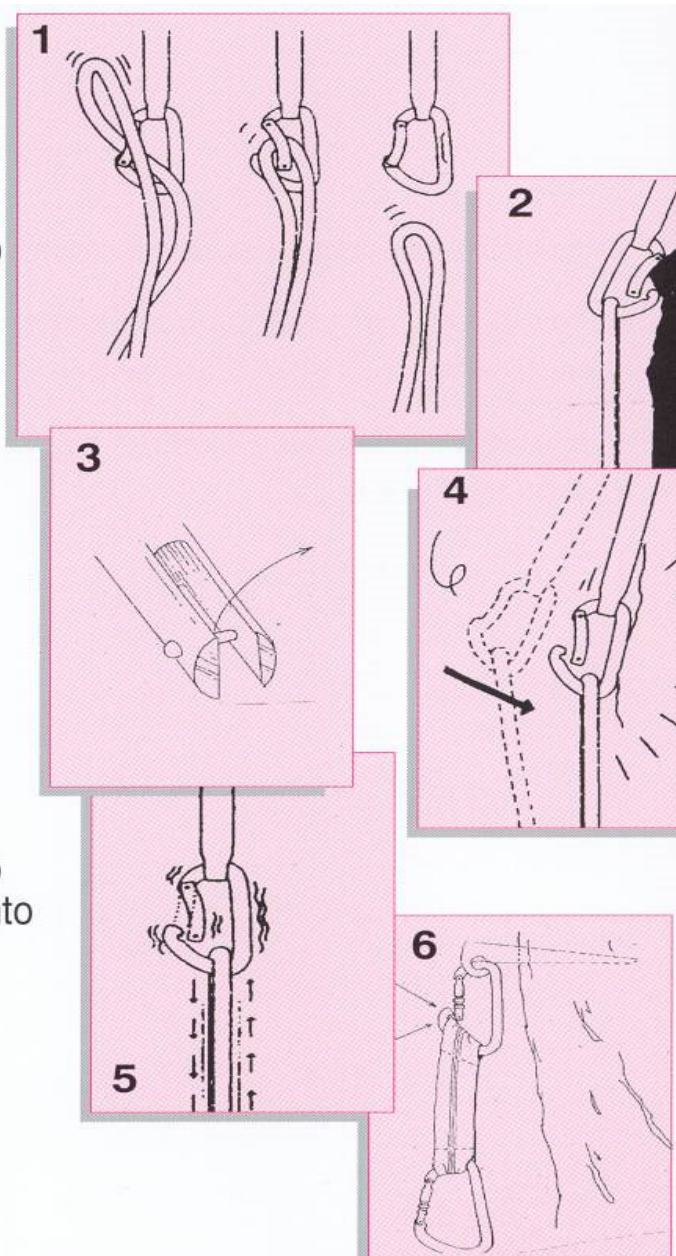
- 2 moschettone inserito in modo errato rispetto la parete rocciosa

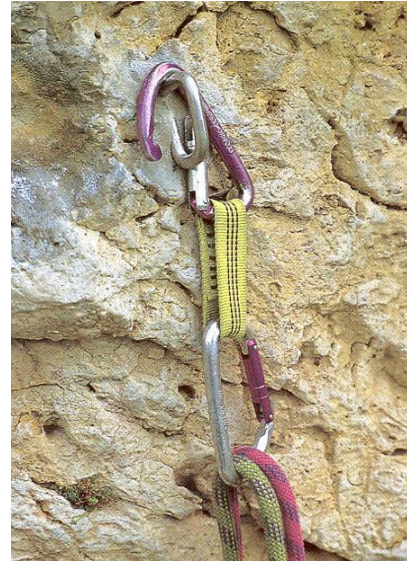
- 3 perdita del perno per usura

- 4 effetto dinamico in seguito a caduta

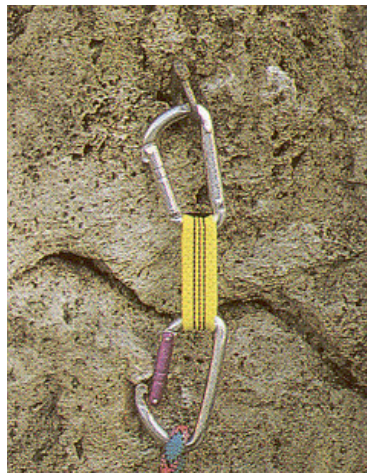
- 5 molla troppo debole: colpo accidentale subito dalla leva o disassamento della stessa a causa di sforzi laterali

- 6 fettuccia mal collegata





Attenzione al posizionamento dei preparati !!!





CHIODI *da* *ROCCIA*



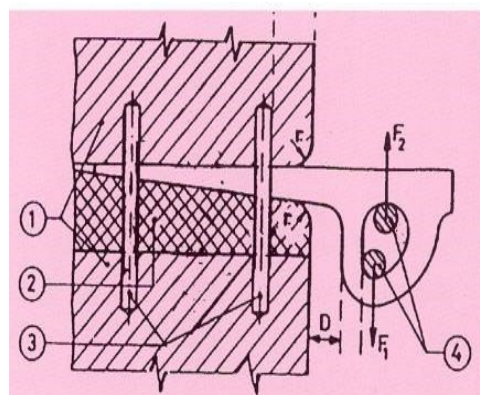


MARCHIATURA

I chiodi devono riportare sulla testa e in modo indelebile le seguenti iscrizioni:

CHiodo DI SICUREZZA
presenta un alto carico di rottura ed è lungo almeno 90 mm
EN 569 (norme europee - vedi pag. 5)
NOME O MARCHIO o fabbricante, o fornitore, o importatore
LUNGHEZZA del chiodo espressa in cm, arrotondata per difetto.
Ⓢ simbolo "chiodo di sicurezza"

CHiodo DI PROGRESSIONE
con minori prestazioni, soddisfa comunque i requisiti di resistenza esposti
EN 569 (norme europee - vedi pag. 5)
NOME O MARCHIO o fabbricante, o fornitore, o importatore
LUNGHEZZA del chiodo espressa in cm, arrotondata per difetto.



VALORI MINIMI DI CARICO DI ROTTURA

Tipo	Direzione		
	F1	F2	F3
Chiodi di sicurezza	kN 25	10	15
Chiodi di progressione	kN 12,5	5	7,5

Velocità di trazione: 35 ± 15 mm/min.

F1 = direzione normale

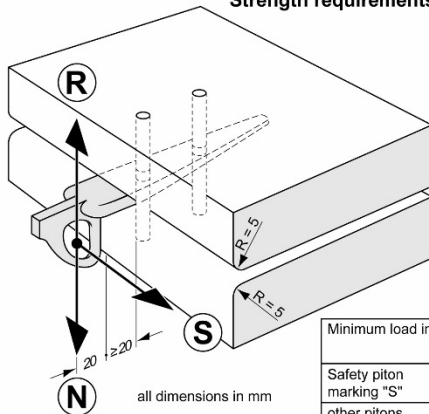
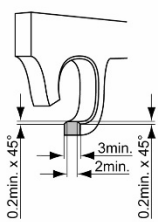
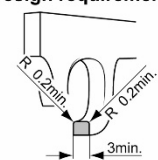
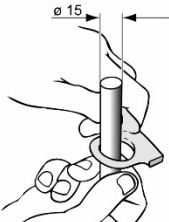
F2 = direzione inversa

F3 = direzione trasversale

Il carico di rottura è il valore minimo raggiunto durante la prova su 3 chiodi (3 campioni di chiodo per ogni tipo di trazione)

Il pittogramma della norma EN 569

page 1 of 1

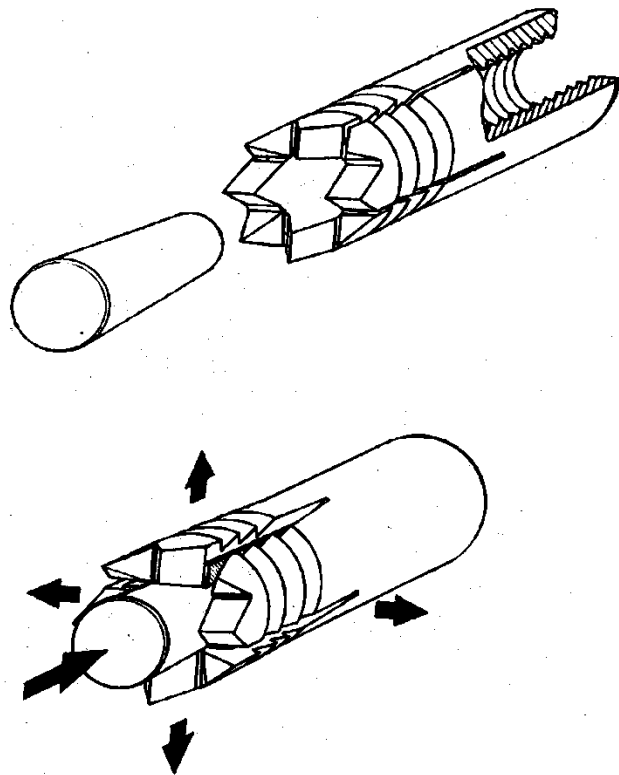
EN-569	PITONS	UIAA-122												
This representation of EN 569 and UIAA 122 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 569 and UIAA 122 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004														
Strength requirements  <table border="1"> <thead> <tr> <th></th> <th>N</th> <th>R</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>Safety piton marking "S"</td> <td>25,0</td> <td>10,0</td> <td>15,0</td> </tr> <tr> <td>other pitons (without marking)</td> <td>12,5</td> <td>5,0</td> <td>7,5</td> </tr> </tbody> </table>				N	R	S	Safety piton marking "S"	25,0	10,0	15,0	other pitons (without marking)	12,5	5,0	7,5
	N	R	S											
Safety piton marking "S"	25,0	10,0	15,0											
other pitons (without marking)	12,5	5,0	7,5											
Design requirements    all dimensions in mm														
Additional UIAA design requirement Two types of pitons concerning their hardness and marking are as follows: Hard steel pitons shall have a hardness of at least HRC = 28 (or HB₃₀ = 270) marking: black or dark colour The hardness of soft steel pitons shall not exceed HRC = 22 (or HB₃₀ = 240) marking: any colour which is not black or dark The eye shall be large enough that a bolt as shown can be inserted Designed by Georg Sojer														



Chiodi a perforazione (tasselli)

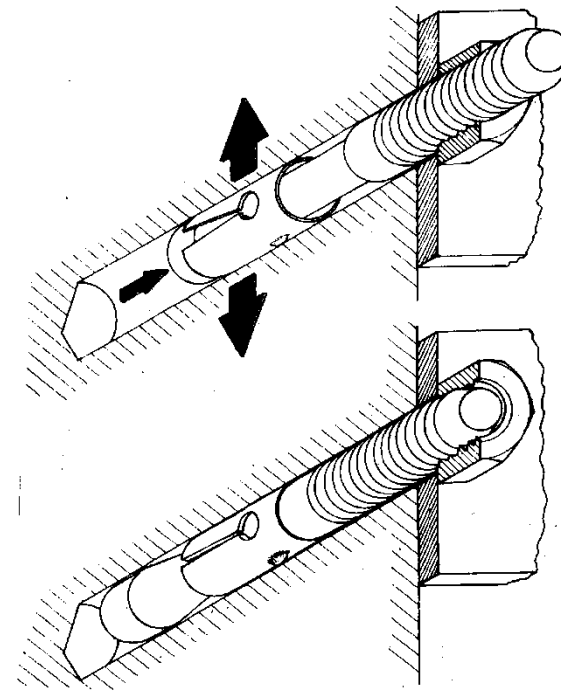
SPIT ROC MF8

foro = prof. 30 mm - diam. 12 mm



SPIT FIX M8

foro = diametro 8 mm



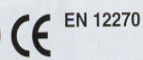
Il pittogramma della norma EN 959

EN-959	ROCK ANCHORS	UIAA-123
This representation does not provide full details. Read the Note at the head of page 1. © UIAA, Pit Schubert, Neville McMillan, 2009		
Design requirements minimum length for all types of rock anchors (not only for samples as shown) minimum length five times the diameter of the drilled hole minimum length 70 mm min. = minimum all dimensions in mm The requirement for smooth edges applies to all edges, which can be touched by fingers after installation in the rock. Designed by Georg Sojer		

EN-959	ROCK ANCHORS	UIAA-123
Note: This representation of EN 959 and UIAA 123 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 959:2007 and UIAA 123:2008 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2009		
Strength requirements for all types of rock anchors (not only for samples as shown) Concrete: ISO TR 9492 compressive strength 50 N/mm² All parts of the rock anchors shall be manufactured from the same material 25 kN EN 15 kN UIAA 20 kN		
Additional strength requirement for glue-in bolts Torque min. 150 Nm for 60 s without any rotation of the bolt Additional UIAA requirement Material of the rock anchors: corrosion-resistant to at least number 1.4307 in accordance with EN10083-3 (but not material 1.4305) Designed by Georg Sojer		



CHOCKS
Art. 835.SET
Size 1 to 11 (11 pieces)

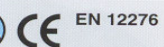


nut e friend

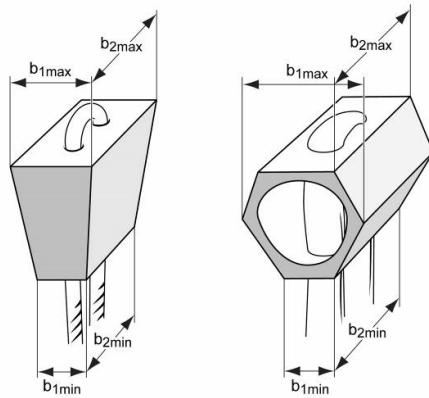
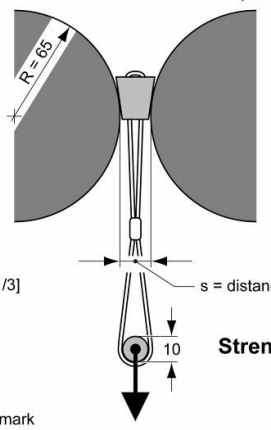
BLOCCHI ad INCASTRO

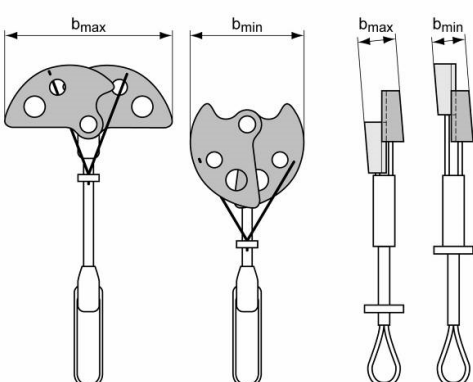
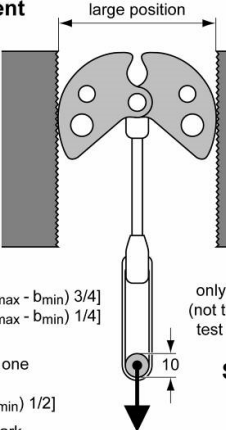
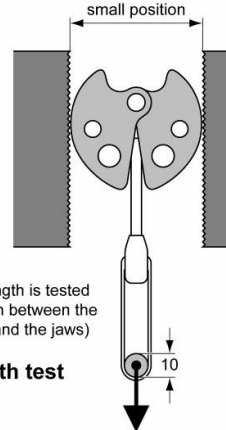


SLIT - FIT
Art. 838.SET
Size 0 to 7 (8 pieces)



Il pittogramma della norma EN 12276

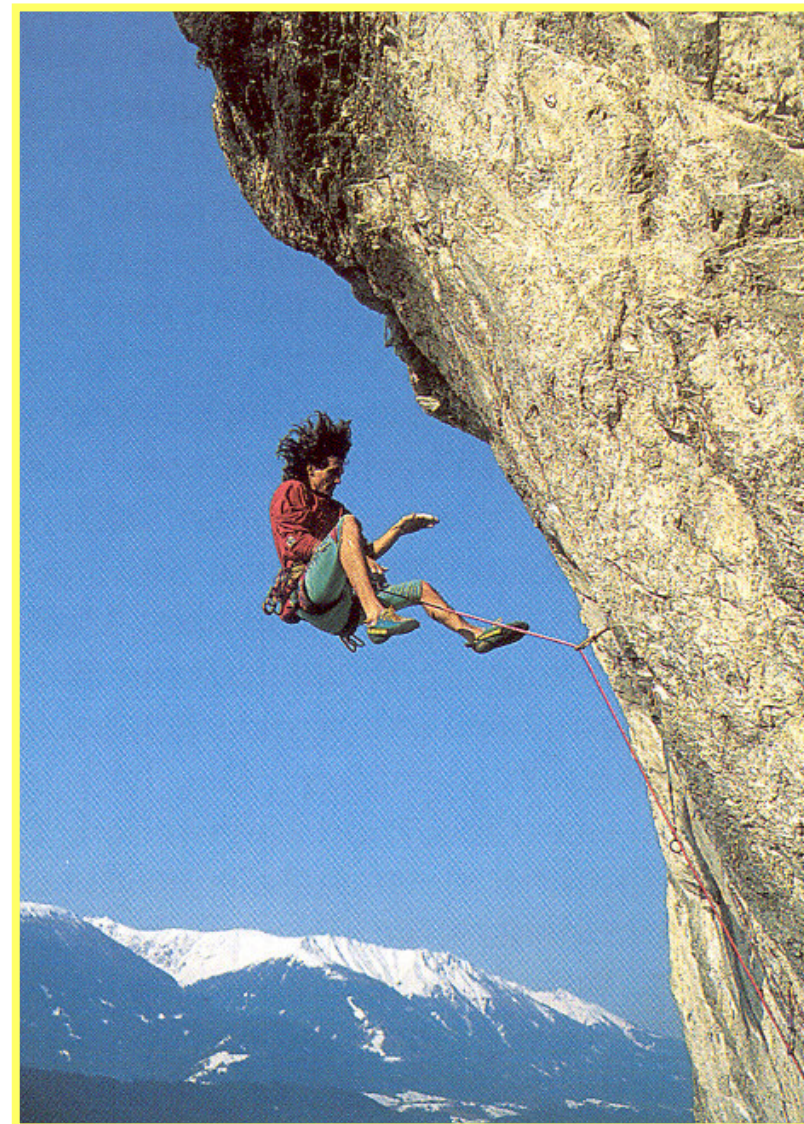
EN-12270	CHOCKS	UIAA-124
This representation of EN 12270 and UIAA 124 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 12270 and UIAA 124 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004		
		Definition of width b_{max} = largest width as shown b_{min} = smallest width as shown
Design requirements The sling for clipping in a karabiner shall be large enough to insert a pin of 15mm diameter.		
Strength requirement for all types and sizes at least 2 kN If a Chock can be placed in different positions all positions shall be tested. all jaws fixed (not rotating)  $R = 65$ Calculation of the distance of the jaws $s = b_{min} + [(b_{max} - b_{min}) 1/3]$ Strength test The manufacturer has to mark on the Chock the minimum load in kN, he guarantees. all dimensions in mm Designed by Georg Sojer		

EN-12276	FRICTIONAL ANCHORS	UIAA-125
This representation of EN 12276 and UIAA 125 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 12276 and UIAA 125 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004		
The general term "Frictional Anchors" is used to include all types as "Friends", "Sliders" etc.		
		Measurement of the range b_{max} = largest width b_{min} = smallest width Design requirements The sling or the eye for clipping in a karabiner shall be large enough to insert a pin of 15mm diameter.
Strength requirement for all types and all sizes at least 5 kN Each Frictional Anchor shall be tested in two different positions, large and small, as shown. large position  small position  only the strength is tested (not the friction between the test sample and the jaws) Strength test Calculation of the two positions large position = $b_{min} + [(b_{max} - b_{min}) 3/4]$ small position = $b_{min} + [(b_{max} - b_{min}) 1/4]$ If the difference between b_{max} and $b_{min} \leq 5mm$, only one position shall be tested: position = $b_{min} + [(b_{max} - b_{min}) 1/2]$ The manufacturer has to mark on the Frictional Anchor the minimum load in kN, he guarantees. all dimensions in mm Designed by Georg Sojer		Additional UIAA requirement If there is a textile means of attachment, whose strength is dependent on the integrity of the stitching, then at least 50% of the visible area of the stitching shall contrast with the background in colour.

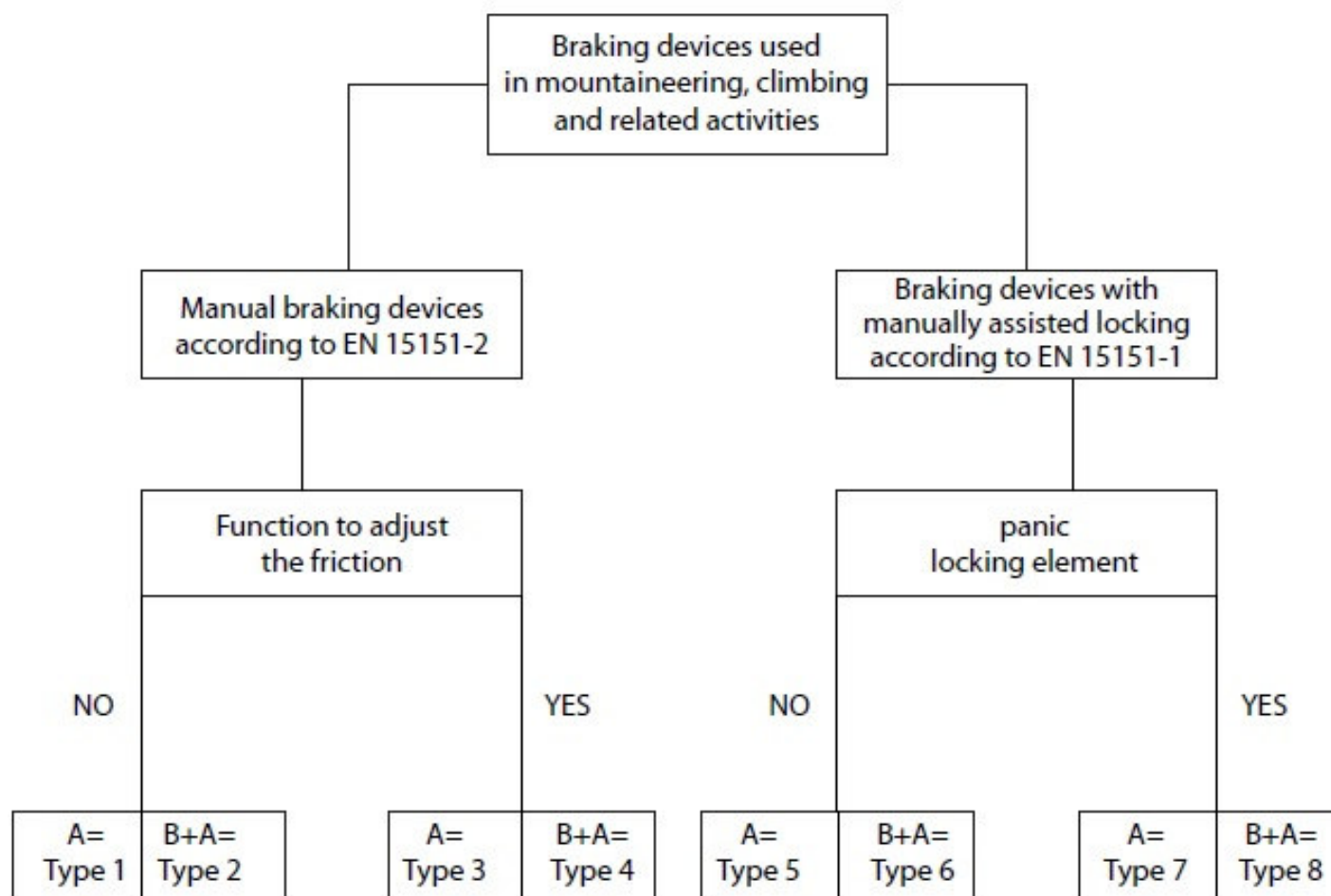
La tenuta degli ancoraggi -
in ambiente - dipende
esclusivamente dal loro
posizionamento!!!

Le norme mi garantiscono
solo la buona costruzione!!!

Nessuna norma può
sostituire l'esperienza e il
buon senso nel loro
posizionamento e nella
valutazione sulla loro
tenuta!!!



Dispositivi di frenatura



A = uso per discesa in corda doppia

B = uso per assicurazione

Dispositivi di frenatura



Manual braking devices

Vari tipi di attrezzi multiuso



Dispositivi di frenatura



Brakin devices with manually assisted locking

Vari tipi di freni

Dispositivi di frenatura

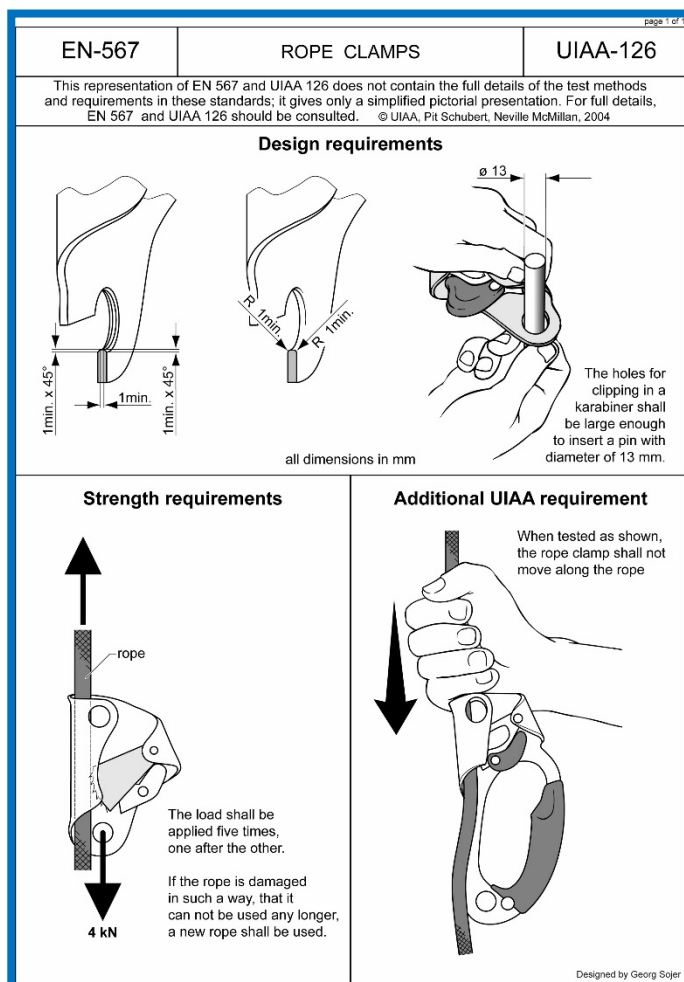
Specifiche	Diametro corda/Tipo corda	Tipo 5	Tipo 6	Tipo 7	Tipo 8
Carico di bloccaggio	Minimo/massimo EN 892 c/o EN 1891	X	X	X	X
Tenuta statica	Minimo/massimo EN 892	X	X	X	X
Prestazioni dinamiche nella assicurazione	Minimo/massimo EN 892	-	X	-	X

Tabella A Specifiche collegate ai dispositivi di frenatura con bloccaggio manuale assistito

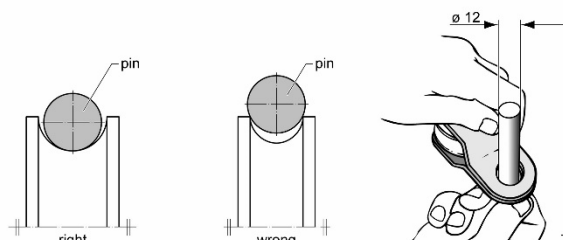
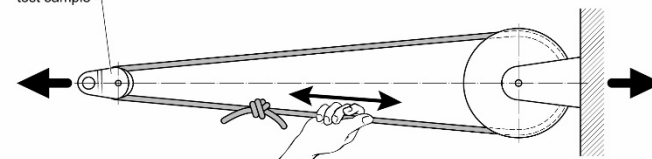
Specifiche	Diametro corda/Tipo corda	Tipo 1	Tipo 2	Tipo 3	Tipo 4
Tenuta statica	Minimo/massimo EN 892 c/o EN 1891	X	X	X	X

Tabella B Specifiche collegate ai dispositivi frenatura manuale

Il pittogramma della norma EN 567



Il pittogramma della norma EN 12278

EN-12278	PULLEYS	UIAA-127						
This representation of EN 12278 and UIAA 127 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 12278 and UIAA 127 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004								
Design requirements  The holes for clipping in a karabiner shall be large enough to insert a pin with diameter of 12 mm. The pulley shall be large enough to accommodate a pin of the largest diameter plus 1 mm, for which the pulley is intended to be used; this pin shall touch the bottom of the groove (not the edges) as shown above.								
Strength requirements Under a static load of 2 kN the pulley shall move in both directions as shown and no deformations shall appear, which can impair its function.  After the test as above the load is increased up to the required strength as shown in the table. <table border="1" style="margin-left: auto; margin-right: 0;"> <thead> <tr> <th colspan="2">minimum strength</th> </tr> </thead> <tbody> <tr> <td>EN</td> <td>12 kN</td> </tr> <tr> <td>UIAA</td> <td>15 kN</td> </tr> </tbody> </table> Designed by Georg Sojer			minimum strength		EN	12 kN	UIAA	15 kN
minimum strength								
EN	12 kN							
UIAA	15 kN							

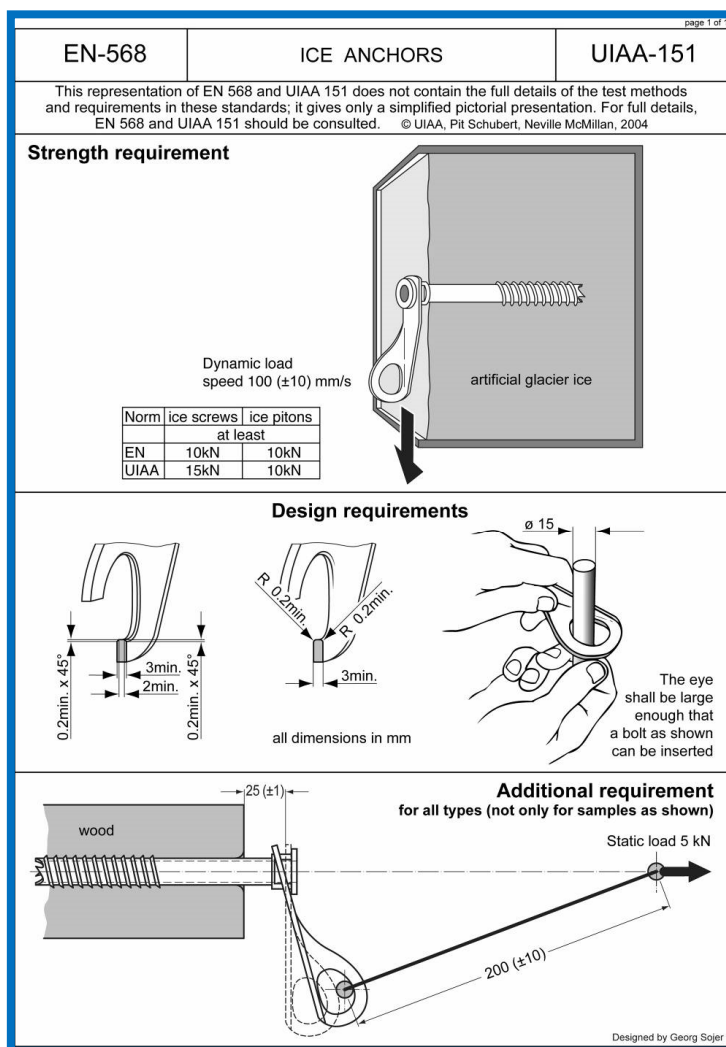


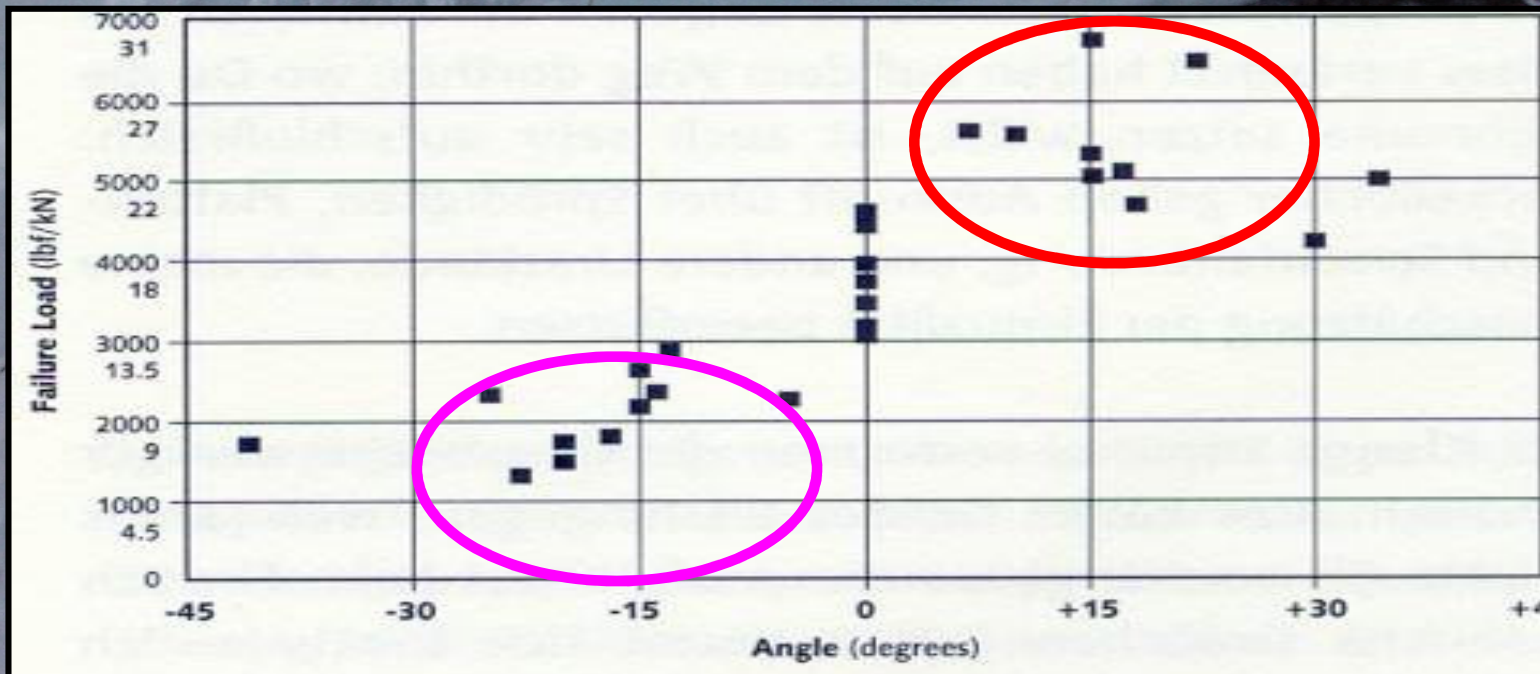
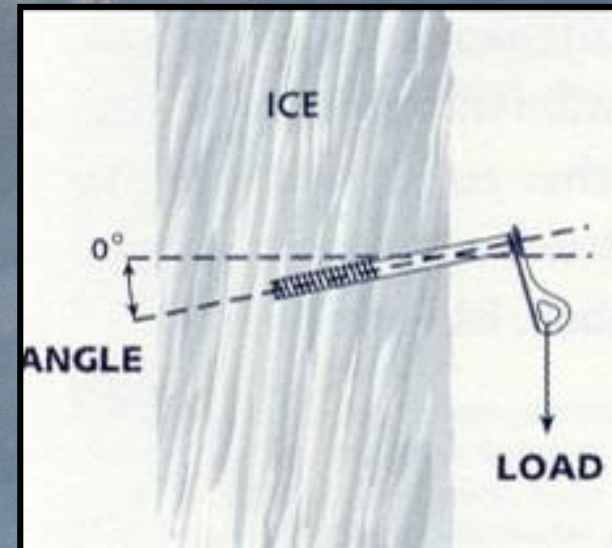
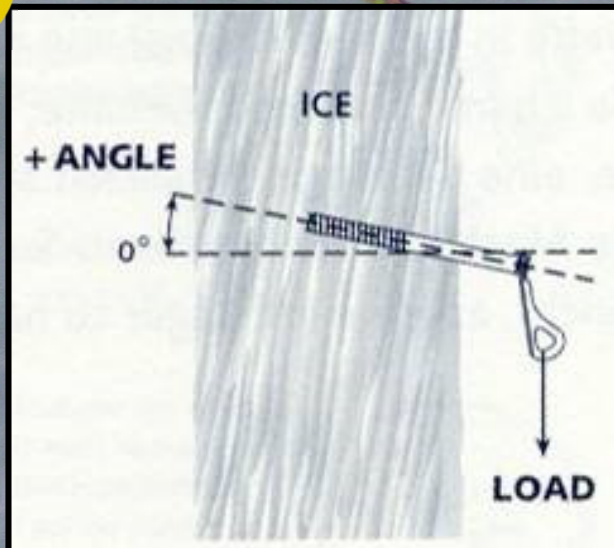


ANCORAGGI da GHIACCIO



Il pittogramma della norma EN 568





Test estrazione dinamica Viti Ghiaccio - Val Varaita gen. e feb. 2008

tipo vite	lunghezza vite cm	tipologia di avvitamento	carico Kg F
Grivel	12	- 20°	465,51
Grivel	12	- 20°	494,17
Grivel	12	- 20°	494,99
Grivel	12	0°	* 1067,63
Grivel	12	0°	763,49
Grivel	12	0°	561,51
Grivel	12	20°	1073,35
Grivel	12	20°	774,37
Grivel	12	20°	* 1232,12
Grivel	12	20°	1055,06
Black Diamond	13	- 20°	531,06
Black Diamond	13	- 20°	695,87
Black Diamond	13	- 20°	570,66
Black Diamond	13	0°	1000
Black Diamond	13	0°	1029,24
Black Diamond	13	0°	736,39
Black Diamond	13	20°	1050
Black Diamond	13	20°	760
Black Diamond	13	20°	* 1321,88

* = Vite non estratta (in tutti gli altri casi la vite è fuoriuscita dalla sua sede)

tipo vite	lunghezza vite cm	tipologia di avvitamento	carico Kg F
Grivel	12	- 20°	1002,49
Grivel	12	- 20°	956,54
Grivel	12	- 20°	627,72
Grivel	12	0°	1080,80
Grivel	12	0°	960,48
Grivel	12	0°	985,73
Grivel	12	20°	* 1113,42
Grivel	12	20°	874,10
Grivel	12	20°	1319,61
Grivel	12	20°	745,66
Black Diamond	13	- 20°	749,17
Black Diamond	13	- 20°	967,14
Black Diamond	13	- 20°	1055,87
Black Diamond	13	0°	1102,52
Black Diamond	13	0°	875,58
Black Diamond	13	0°	834,45
Black Diamond	13	20°	994,69
Black Diamond	13	20°	861,38

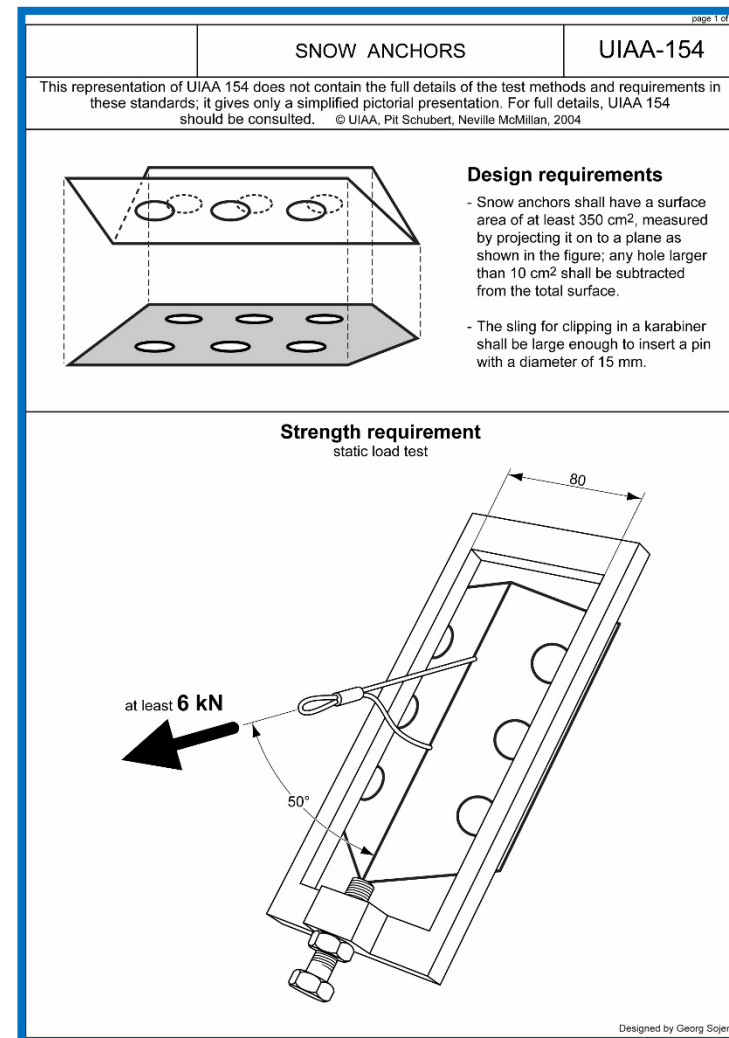
*** = Vite non estratta** (in tutti gli altri casi la vite è fuoriuscita dalla sua sede)

ANCORAGGI da NEVE



La disposizione del cavetto metallico è tale per cui, quando sollecitato, tende ad affossare ulteriormente l'attrezzo nella neve aumentandone la tenuta.

Il pittogramma della norma UIAA 154





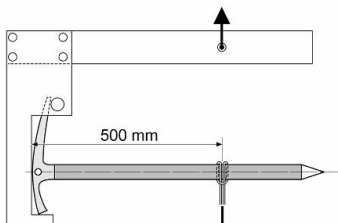
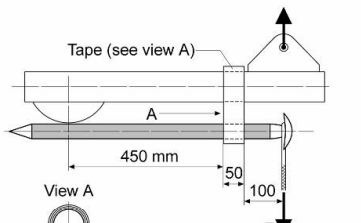
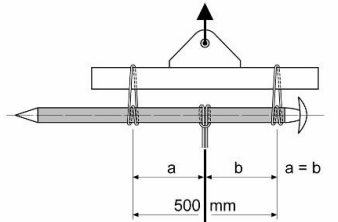
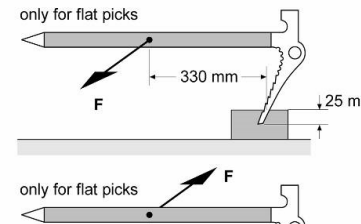
ATTREZZI da GHIACCIO

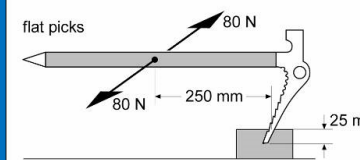
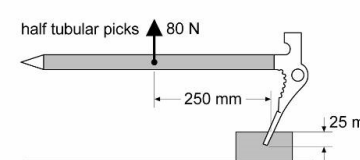
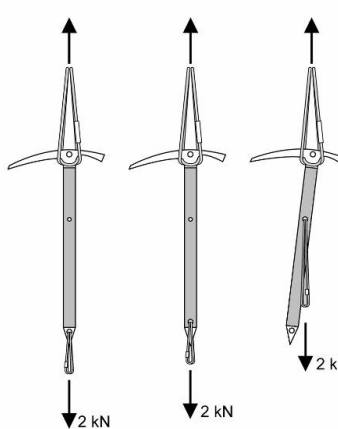
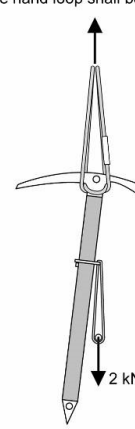


Materiali Alpinismo, Norme

Giuliano Bressan

Il pittogramma della norma EN 13089

EN-13089	ICE TOOLS (Axes and Hammers)	UIAA-152
This representation of EN 13089 and UIAA 152 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 13089 and UIAA 152 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004 Concerning the strength two types of ice tools exist in accordance with these standards: Type Ⓑ=Basic type, with lower strength, for use in general circumstances as on glacier, for snow hiking, for ski mountaineering etc. Type Ⓢ=Technical type, with higher strength, for use in all circumstances especially for ice climbing, dry tooling etc. Shafts and picks shall both be marked with the symbol of the type in a circle as shown		
Static tests  F for type Ⓑ 0,6 kN F for type Ⓢ 0,9 kN  F for type Ⓑ 2,5 kN F for type Ⓢ 4,0 kN  F for type Ⓑ 2,5 kN F for type Ⓢ 3,5 kN  F for type Ⓑ 127 N F for type Ⓢ 182 N permanent deformation at the point of load after loading max. 70 mm for all these tests see *) on page 2 Designed by Georg Sojer		

EN-13089	ICE TOOLS (Axes and Hammers)	UIAA-152
Fatigue tests only for type Ⓢ  minimum 50,000 cycles between the values +80 N and -80 N, as shown  minimum 12,000 cycles between the values 0 and +80 N, as shown *) For all these tests: If the shaft of the ice tool is not long enough for the distance as drawn, shorter distances can be used with corresponding increases in the applied loads, to generate the same bending moment.		
Additional UIAA requirements Static tests Longitudinal test for type Ⓑ and Ⓢ  2 kN If an ice tool has a hand loop, the hand loop shall be tested  2 kN Designed by Georg Sojer		

L'ultima edizione della norma (2007) ha classificato le piccozze come segue:

- **Piccozza di tipo 1**

Piccozza con una connessione manico-lama adatta all'utilizzo su neve/ghiaccio (progressione su ghiacciai, per escursionismo e/o alpinismo su neve/ghiaccio e per sci alpinismo).

Questo tipo di piccozza, che nella vecchia norma era indicato come “di base”, non richiede marchiatura che ne definisca la categoria.

- **Piccozza di tipo 2**

Piccozza con una connessione manico-lama adatta all'utilizzo su roccia, oppure su neve/ghiaccio. E' adatta per progressione su terreni tecnicamente difficili quali ghiaccio ripido e “dry tooling”.

Questo tipo di piccozza deve riportare (sia sul manico che sulla lama) un marchio, costituito da una “T” all'interno di un cerchio.



L'ultima edizione della norma (2007) ha classificato le piccozze come segue:

- **Lama di tipo 1**

Lama da utilizzare su neve/ghiaccio.

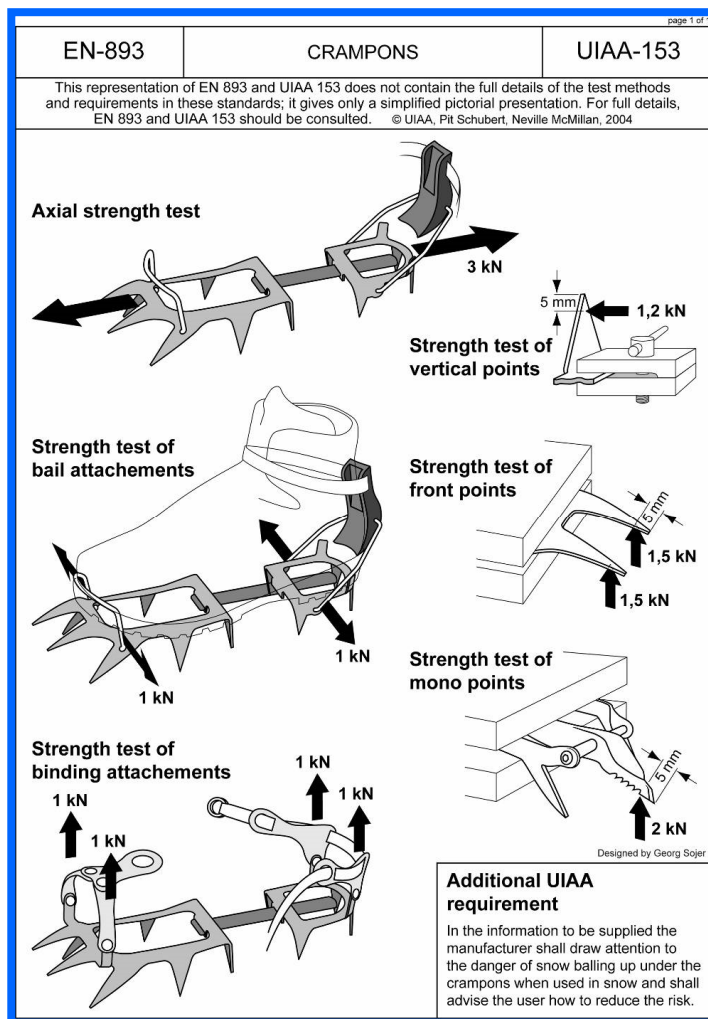
- **Lama di tipo 2**

Lama da utilizzare su roccia oppure su neve/ghiaccio.

La distinzione, anche se può apparire complessa, è dovuta alla differenziazione delle caratteristiche meccaniche richieste per le diverse parti, con particolare riguardo alla connessione manico-lama.

Va fatto rilevare che la piccozza, o il martello piccozza, possono essere utilizzati anche come ancoraggio su terreno nevoso; per questo motivo è richiesta una particolare resistenza del manico, che è la stessa per i tipi 1 e 2.

Il pittogramma della norma EN 893





ASSORBITORI DI ENERGIA

La nuova norma: EN 958-2017



Il pittogramma della vecchia norma EN 958 - 2006

EN-958	ENERGY ABSORBING SYSTEMS for "vie ferrate"	UIAA-128
This representation of EN 958 and UIAA 128 does not contain the full details of the test methods and requirements in these standards; it gives only a simplified pictorial presentation. For full details, EN 958 and UIAA 128 should be consulted. © UIAA, Pit Schubert, Neville McMillan, 2004		
Type "Y" Type "V" handling of type "Y" is easy handling of type "V" is more complicated		EN 958 - No requirements concerning the figures as shown UIAA 128 - Only type "Y" is allowed The two figures below show the different use of type "Y" and "V". - Type "V" is more difficult to understand and use correctly. Only one connector should be clipped to the wire cable, except when passing an anchor. If a fall occurs when both connectors are clipped to the wire cable, there will be no energy absorbing capability.
Type K (Klettersteig) Connector for "Via ferrata", "Klettersteig"		If Energy absorbing systems (EAS) contain connectors (karabiners) when sold, the connectors shall be in accordance with EN 12275 and UIAA 121, Type "K" (K = Klettersteig), which means a higher strength according to EN 12275 and UIAA 121, and an additional minimum bending strength according to UIAA 121.
Static load test 1,2 kN without slippage afterwards 9 kN without breaking Designed by Georg Sojer		

EN-958	ENERGY ABSORBING SYSTEMS for "vie ferrate"	UIAA-128
Dynamic load test braking part falling mass 80 kg inextensible peak force ≤ 6 kN fall height 5m slippage of the braking part $\leq 1,20$m		
Note: Because the performance of the EAS depends on the friction between the rope and the braking device, the system shall be supplied complete; the braking device shall not be supplied separately. Connectors that are not an integral part of the system may be supplied separately.		
All tests shall be done after conditioning as follows: 24 h (50 ± 5) °C and ≤ 10 % rel. humidity, after that 2 h (20 ± 2) °C and ≤ 65 % rel. humidity, after that 72 h (20 ± 2) °C and (65 ± 2) % rel. humidity.		
Additional UIAA requirement Only Type "Y" is allowed (it is safer). All load bearing connections shall be designed to be unalterable connections, hence knots are not allowed. Designed by Georg Sojer		



Rispetto alla versione precedente sono cambiati molti aspetti costruttivi e di prestazione.

Ecco le prestazioni dinamiche richieste dalla nuova norma EN 958-2017

Elemento	Test 1	Test 2	Test 3
M	40 kg	120 kg	120 kg
EAS <i>bagnato o asciutto</i>	Asciutto	Asciutto	Bagnato
Ramo (i)	2 rami collegati	2 rami collegati	Più vincolante (configurazione con la massima lunghezza di frenata)
F_{max}	3,5 kN	6 kN	8 kN
L_{max}	< 2200 mm	< 2200 mm	< 2200 mm
M: massa di acciaio pari al peso dell'utilizzatore: massimo (con attrezzatura) e minimo (senza attrezzatura). F_{max}: Forza d'arresto massima ammissibile, registrata durante il test dinamico L_{max}: Lunghezza massima di frenata			



...buone scalate

...in sicurezza !!!