

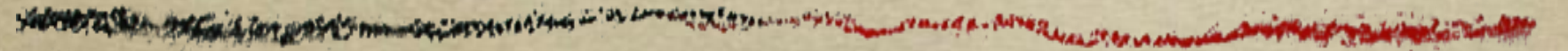


Ski Cross Officials Training

*Safety Information for Technical Delegates
and all on snow Officials*



Athlete Protection



Helmets

- *Ski Helmets are compulsory for all FIS Freestyle Skiing events.*
- *FIS Equipment Rules, Section E, 6.5*
 - *The National Ski Associations shall require their athletes to use helmets which conform to recognized and appropriate standards including CEE 1077 or US 2040, ASTM F2040, etc.*



Back Protectors

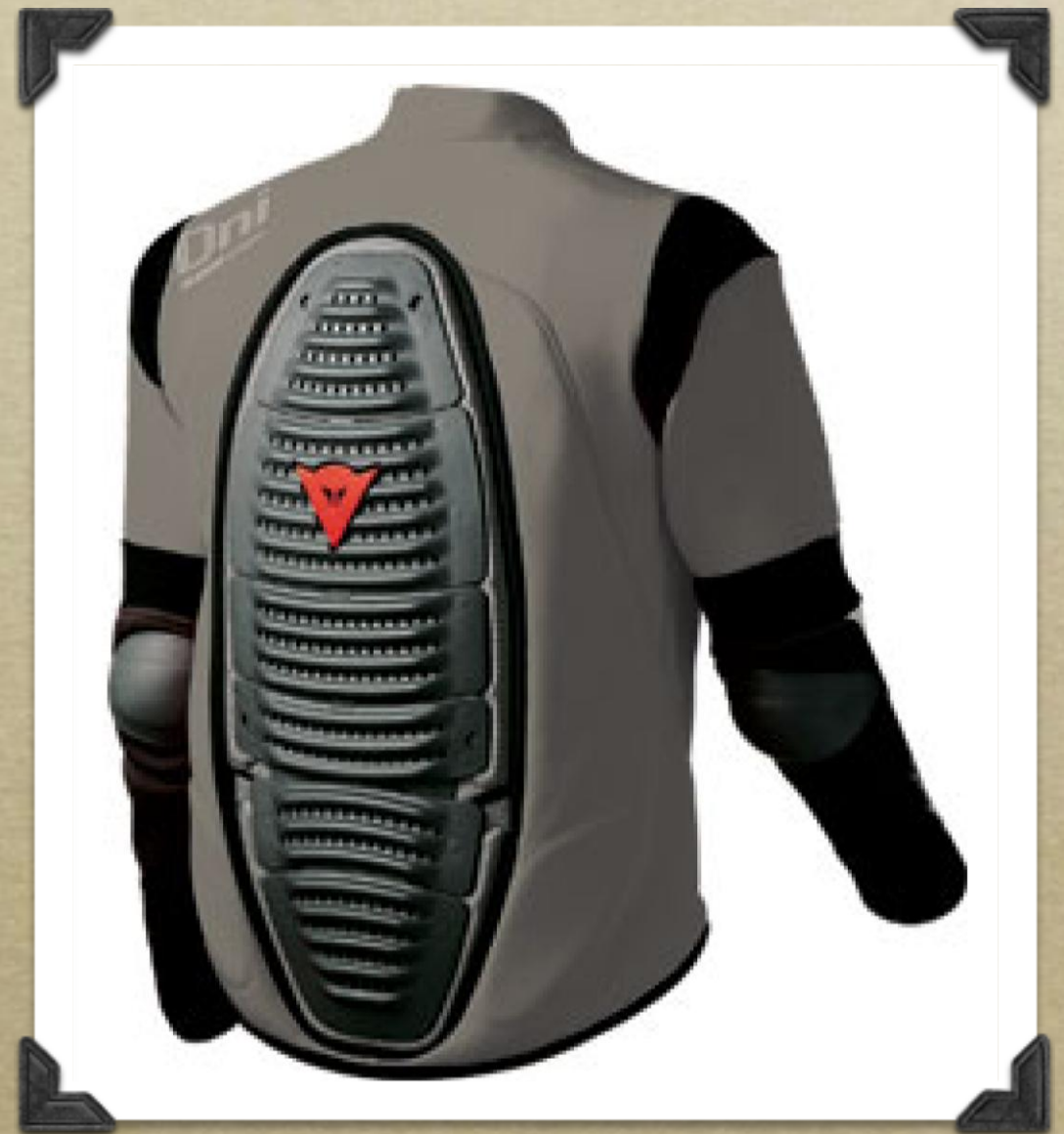
- *Definition (FIS Equipment Rules, Section E, 9.1)*
 - *The back protector is an additional item of equipment, which protects the athlete's back against weather and external forces. The use of back protections is recommended.*



Back Protectors

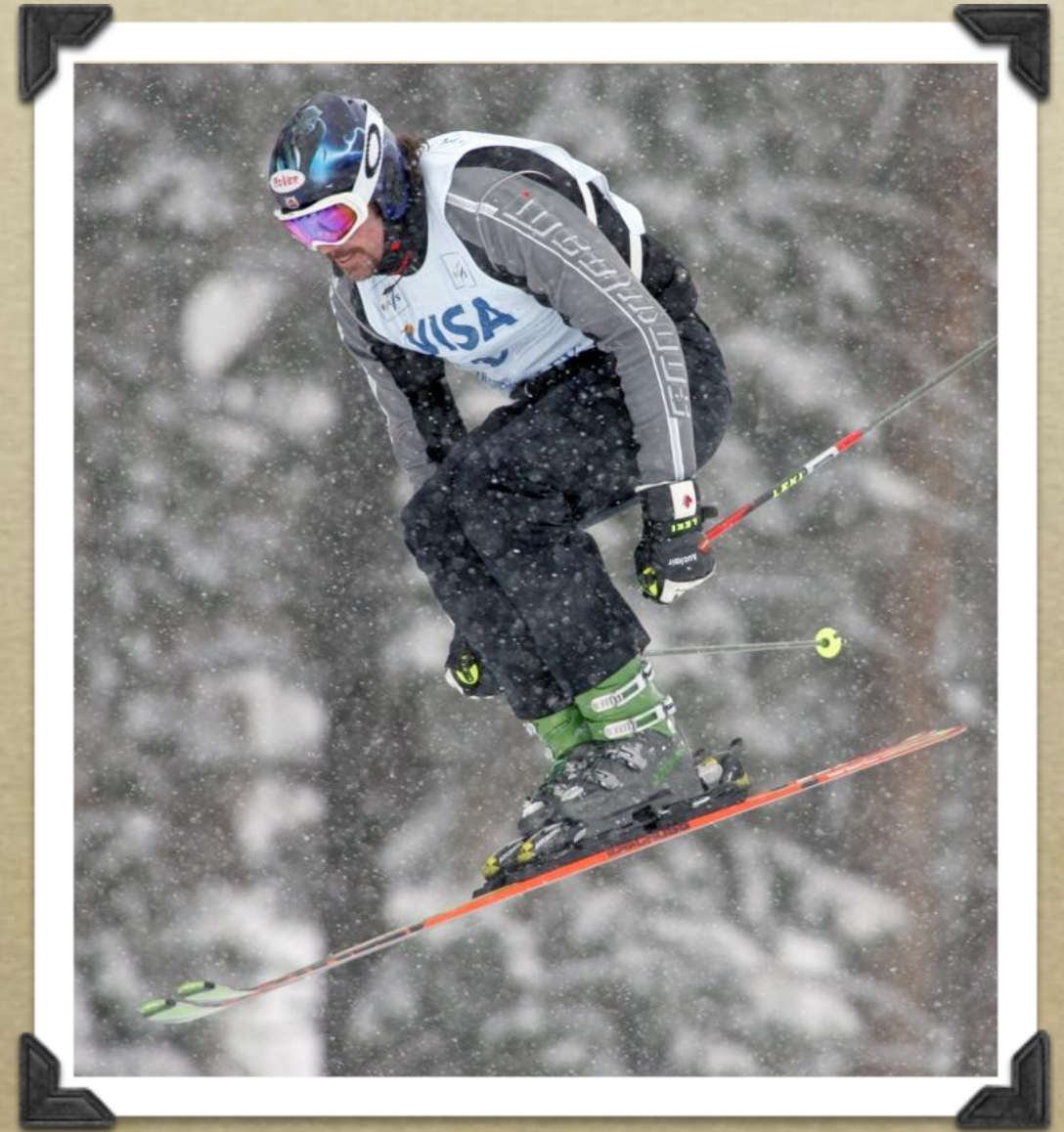
- *Specifications*

- *The back protector must adapt to the anatomical bend of the athlete's spine and lay flat against the body. The top edge of the back protector has to be situated in the area of the spinal column. Fastening of the back protector may take place with a stomach belt, straps or suspenders. The maximum thickness has to be in the middle part and may not exceed 45 mm; the thickness reduces towards the edges of the back protector. The back protector may be worn exclusively under the competition suit.*



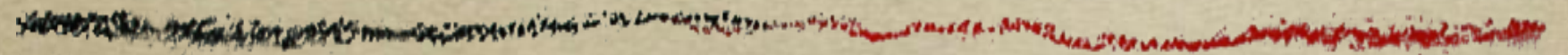
Ski Suits

- *Rule 4511.4*
 - *Ski suits must be 2 pieces – pants & a separate top. Form fitting speed suits or downhill suits are not permitted.*
 - *Non protruding body protection and padding is recommended*
 - *Protection equipment must be worn on the body. No straps, fastening devices or other methods can be used to tighten the suit material closer to the body.*
 - *The gap in material must be 60mm, measured anywhere around the circumference of the mid thigh, the knee, the top of the ski boot on the lower body and around the elbow and the bicep on the upper body.*





Course Inspection



Athlete Course Inspection

- *Rule 4504 – Inspection/Training*
 - *Inspect the course by slowly sliding down through or alongside the course.*
 - *Minimum of 15 minutes (discretion of Jury)*
 - *All competitors are required to complete at least 1 inspection run prior to training.*
 - *Athletes must visibly wear bibs and helmets*



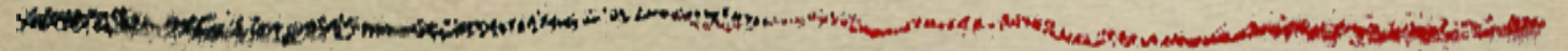
Athlete Course Inspection

- *TD Comments:*
 - *During Inspection and Training, Jury members are to be present and placed along the length of the course.*
 - *Finish Referee will be in the finish area to receive comments.*
 - *Start Referee will monitor the start and take note of which athletes have completed inspection and training runs.*





Course Colouring



Why Add Colour

- *Adding colour to the Ski Cross course:*
 - *Provides definition of jump take off points*
 - *Provides clear direction for the appropriate line of travel*
 - *Helps define compression areas and side hill*
 - *Provides definition in low light conditions*



Where to Add Colour

- *Colour should be added to:*



Each Feature



Turns & Jumps

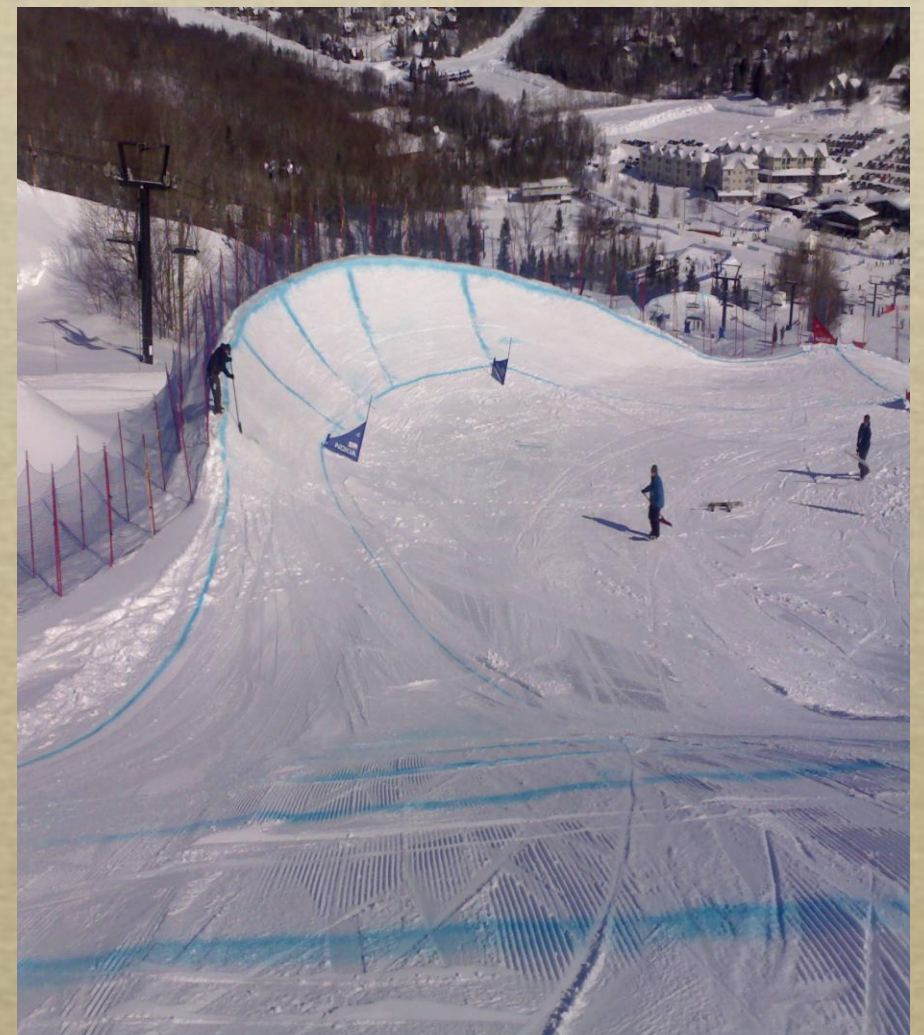


Inside of Turns

- *Heavier Colour should be used on jumps (take offs & landings)*



Jumps, Banks, Rollers





Use of Safety Installations

Installing Safety Measures

- *Installing safety measures helps to reduce the risk of trauma to the Ski Cross Athlete, BUT...*
- *First and Always seek to AVOID risky circumstances*
- *Understand how safety installations, when properly installed, can DEFLECT the athlete away from obstacle*
- *DECELERATION PRINCIPLE:*
 - *Extend the DISTANCE to Reduce the SHOCK*



Rule of Thumb

- Competitor Protection Measures:
 - *Avoidance*
 - *Deflection*
 - *Deceleration*
- Remember:
 - *Avoidance is preferable to Deflection, which is preferable to Deceleration*



Avoid Risky Circumstances

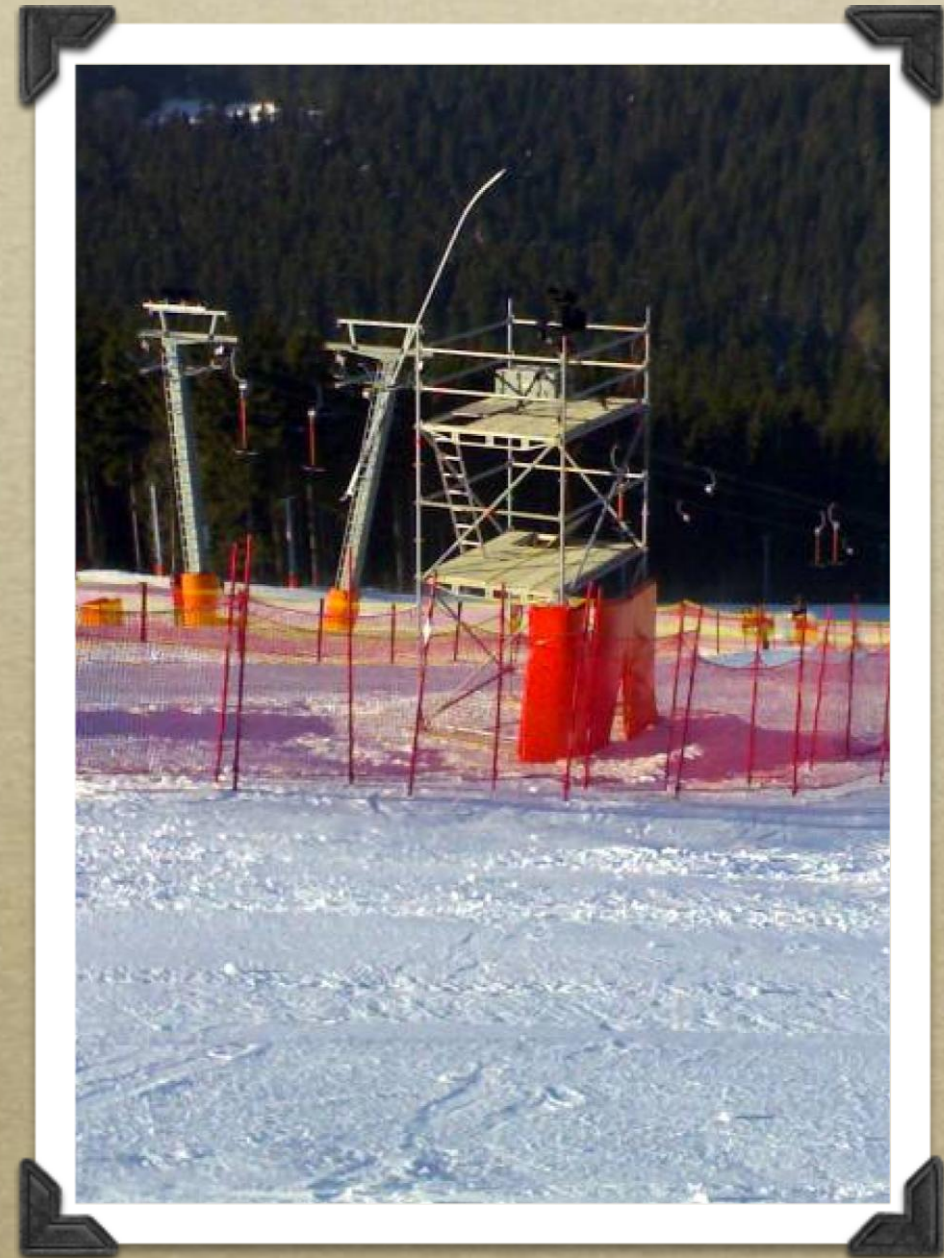
- *Avoid Fixed Obstacles (e.g. snow making hydrants, trees, ravines, lift towers)*
- *Be aware of changing weather conditions*
- *Be conscious of the abilities of all the competitors –match the course design to the athletes' abilities*
- *Keep the fall zones clear and unobstructed*
- *Maintain control of access to, and movement on, the race trail*

Deflection

- *Where possible, the preferred method of managing the potential for collision is to **DEFLECT** the object away from the collision*
- *An oblique impact, by its nature, allows the colliding body to continue along a **DEFLECTED PATH** that is oblique from the path of incidence to the collision*
- *The principle of deflection presumes that the body in collision will be deflected into a clear area where it can continue along an unobstructed path of travel and decelerate to a stop*

Deflection – Examples

- *Set nets in front of fixed obstacles to deflect, not to catch*
- *Set slip sheets on nets & fences where oblique impact may occur*
- *Deploy foam ramps in front of finish timing equipment*
- *Deploy mattress fences that funnel a racer over the finish line*
- *Employ the nature fall line of the slope to direct the racers' line*
 - *Ensure “landing zones” are located on down slopes*
 - *Use cushions & pads as a last line of defense behind primary netting*



Deceleration

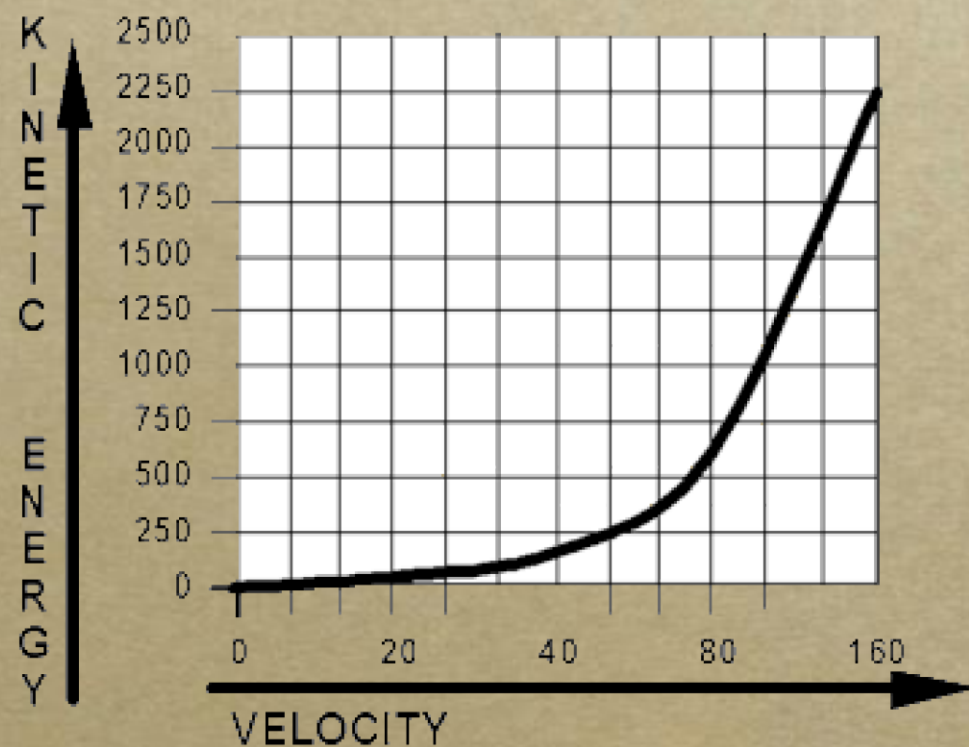
- *The guiding principle of **DECELERATION** is:*
 - *Extending the distance within which a traveling body decelerates will reduce the peak force to which it is subjected when stopping*

Deceleration

- *Provide a sufficient space, or a soft and springy net, that will slowly reduce a speeding athlete and bring them to a controlled halt without an abrupt stop*
- *Remember “s_t_r_e_t_c_h” the stop out over a greater distance and the kinetic energy is dissipated with less impact force. The longer a time given to stop, or conversely the greater the distance, the less will be the peak force of the impact*

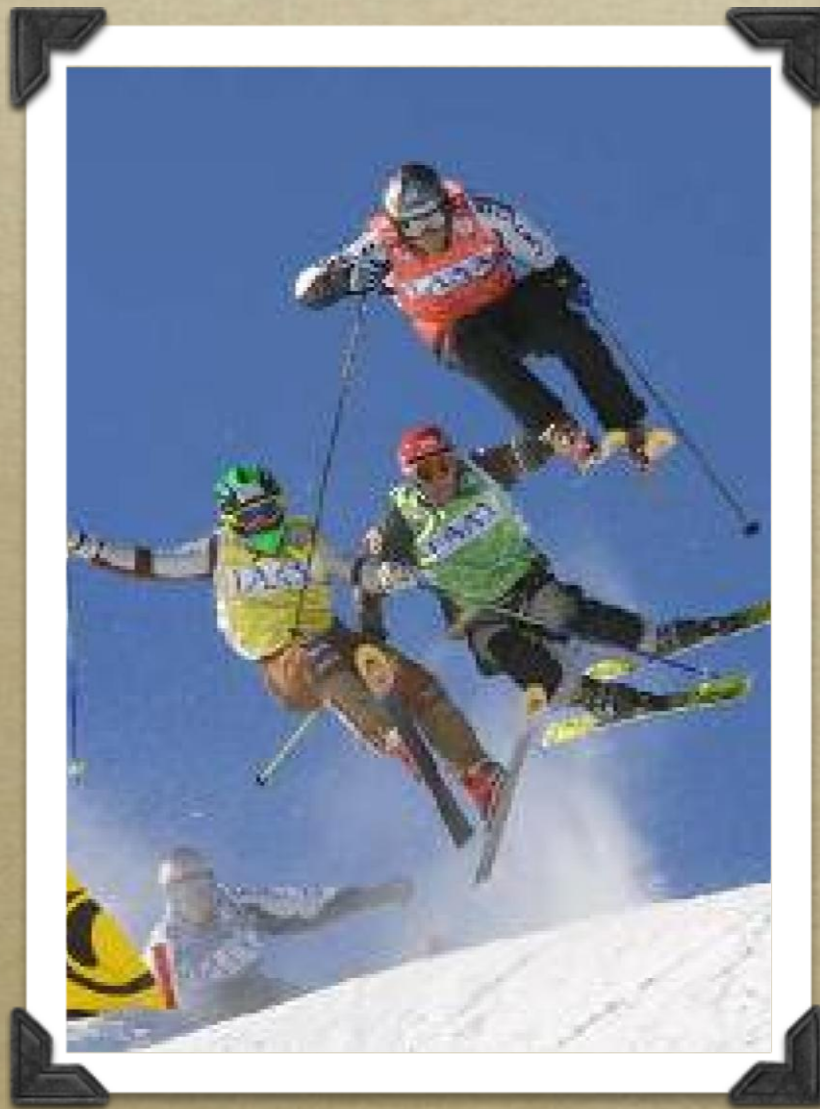
Points to Consider

With each doubling of the speed, the kinetic energy far more than doubles.



- *For every 10 mph increase in speed, the stopping distance almost doubles*
- *For example, at 60 mph it takes almost twice as far, or twice the amount of time, to stop as at 50 mph*

Points to Consider



- *Average Speed for athletes on the FIS World Cup Ski Cross circuit is approximately 65 kph (for Men) and 60 kph (for Ladies)*
(source: Joe Fitzgerald, FIS, September, 2007)
- *Average Speed in SX is equivalent with GS in Alpine*
- *Safe Stopping Distance for Ski Cross athletes is approximately 80 feet*

Spill Zone Distance

- *Rule of Thumb for estimating Spill Zone Distance:*
 - *Maintain an unobstructed area below the gate line of:*
 - *approximately 3 racer lengths for Slalom*
 - *approximately 6 racer lengths for Giant-Slalom*
 - *approximately 12 racer lengths for Super-G*
 - *approximately 24 racer lengths for Downhill*
- *Increase this basic distance by the percent grade of the slope*
 - *e.g. Slope = 25% grade. GS Racer is 6 feet tall, therefore spill zone is 6 feet x 6 lengths = 36 feet + (36 feet x 0.25) = 45 feet*

Using Netting & Fences

- *Using B-Netting will:*
 - *Protect athletes from hitting obstacles – 1st line of defense*
 - *Reduce the athlete's speed when she or he falls*
 - *Reduce the risk of trauma to the athlete*
 - *Maybe used in 1, 2 or 3 rows*
- *Using Crowd Control Fencing will:*
 - *Keep spectators off the Ski Cross course*



B-Net System

- *B-Net systems are a dynamic protection system formed by a protection net assembled to very sturdy net supporting poles and equipped with adjustable net clips for net fastening.*
- *B-Nets are the best protection in all slope areas where it is not possible (or convenient) to use immovable protection nets (A-Net system).*



B-Net System

- *B-Net Systems are used:*
 - *On High Speed Areas*
 - *Near trees close to course*
 - *Around temporary technical installations (e.g. TV towers)*
 - *Near ski resort installations (e.g. Lift Towers, Snowmaking hydrants)*
 - *In spill zones*
- *B-Net Systems are used as a 1st line of defense with padding &/or willy bags as a 2nd line of defense*



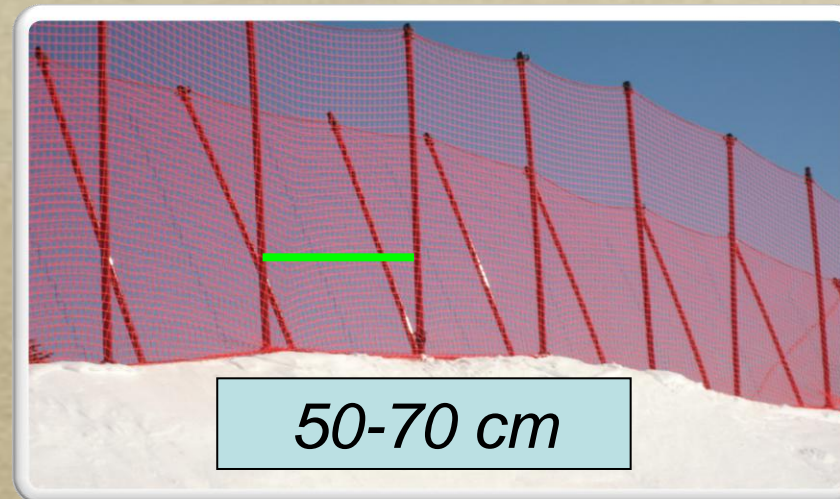
B-Net System

- *B-Net must be installed according to the manufacturer's/system's design instructions.*
 - *Alpina, Barry and Liski (manufacturers) all have different install guidelines and concepts*
- *Generally, B-Nets must be (unless directed otherwise by manufacturer):*
 - *spaced no closer than 2m between rows*
 - *installed with the base of the net at snowline*
 - *positioned carefully on banked turns*

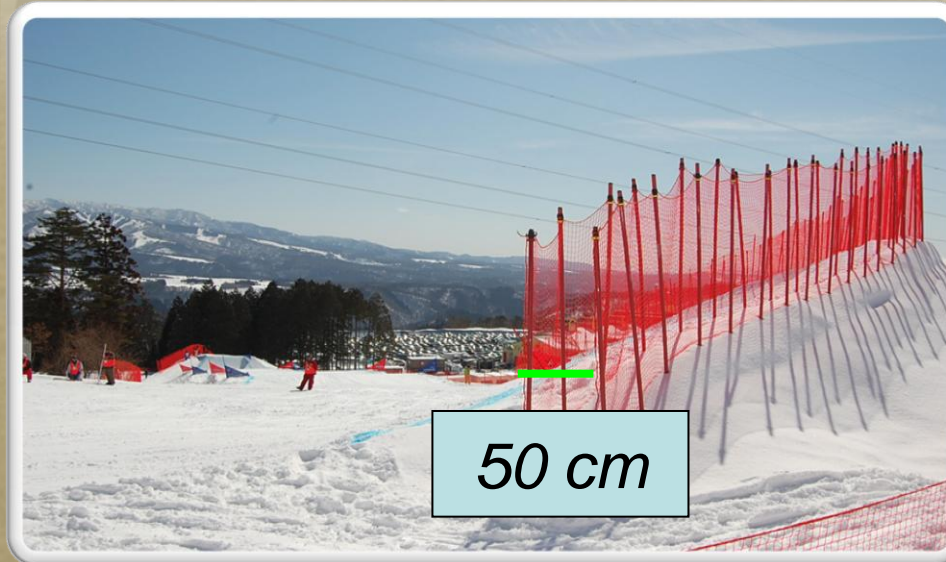


B-Net System

- Pole distance 50-70 cm
- Tension on the B-fence
- Poles drilled a-symmetric



- Double fencing on banks
- Placed on top of the bank
- Fence distance approx. 50 cm



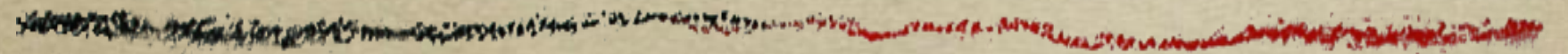
Use of Padding

- *Cushions and pad may be hung from television towers, trees, snowmaking hydrants and other structures of a permanent nature.*
- *Cushions are usually the last line of defense behind a primary net that is intended to deflect the skier away from the structure.*
- *Even as a secondary measure, the pads are typically hung so as to deflect the skier back onto the unobstructed trail, rather than catch them*





Medical



FIS Medical Guide

- *Emergency medical services must be available each of training & competition*
- *Medical facility or tent placed near the finish*
- *Top of course medical for athletes prior to the competition*
- *A fully equipped ambulance with Advanced Life Support Team and a replacement vehicle for transport must be available at official training & competition.*

FIS Medical Guide

- *A rescue helicopter or a medically equivalent evacuation method must be available on a basis consistent with local law.*
- *The chosen method of evacuation must be capable of immediate patient off-hill evacuation*



Emergency Action Plan

- *Every Race Organizing Committee (ROC) must have an Emergency Action Plan (EAP) approved by the TD or Race Director.*
- *A Medical Meeting must be arranged at the beginning of official training for team medical staff. The EAP is communicated and discussed at this time.*

Emergency Action Plan

- *The EAP must include:*
 - *Key medical personnel & contact information*
 - *Location of Level 1 Trauma Hospital*
 - *Course Maps with medical stations listed*
 - *On-course medical rescue protocols*
 - *Public injury response protocols*
 - *Medical facilities on-venue*
 - *Location and contacts for hospital, medical imaging facilities, medical clinics, pharmacy*
 - *Evacuation and Transport times to facilities*

On Course Medical

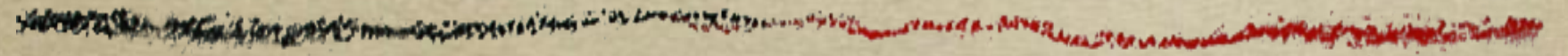
- *Doctors, EMS personnel and ski patrol must be on-course during all official training and competition.*
- *ALS equipment must be on-course and accessible for all official training and competition.*
- *Ski Patrol / EMS personnel should be located along the course:*
 - *Top of Course – 2 personnel with 2 sleds, backboards and ALS equipment. 1 Medical Doctor is advised*
 - *On Course – at appropriate intervals along the course to easily access skiers.*
 - *Finish Area – 1 Medical Doctor*

On Course Medical

- *Emergency exit areas along the length of the course should exist to permit medical personnel to enter and exit the course as required.*
- *Dedicated lanes for patient transport should be established outside of the fencing to patients can be quickly evacuated off-hill with minimal disruption to race operations.*



Other Safety Measures



On Course Safety

- *Use of Course Control Flagging to slow down or stop racers when the course is obstructed (e.g. fallen skier on course)*
- *Suitable timing intervals during training to decrease congestion on course*
- *Smoothing out ruts in turns*
- *Cleaning take off areas of jumps*
- *Avoid blind jumps & terrain features*

On Course Safety

- *Prudent placement of banners & frames in non-spill zone areas*
- *Clear radio communication along the entire length of the course*
- *If Ski Cross course has a public walkway, this area must be strictly marshaled*
- *Coaches must be located in specific areas along the course (e.g. coaches' corner)*

On Course Safety

- *Gap Jumps, where there is “hole” between the take off and landing, are not permitted!*
- *The long pole side of the Ski Cross triangular gate flag must be:*
 - *a non-breakaway pole*
 - *longer than the height of the gate flag*
- *Jumps must match the ability of the skier; length of landings must match speed athletes are traveling*

Contributions

- *Bruce Robinson, Chief Operating Officer, CFSA*
- *Joe Fitzgerald, Freestyle Coordinator / Race Director, FIS*
- *Heli Herdt, FIS SX Working Group*
- *Chris Moore, Chief of Competition –SX, 2010 Olympic Winter Games*
- *Erik Kalacis, Technical Delegate –SX/HP, 2011 Freestyle FIS WSC*
- *Ted Martin, Technical Delegate, SBX*
- *Jim Sidorchuk, Technical Delegate, SX & SBX, Ski Cross National Officials
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