Ski Cross Course Guidelines

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1. General Goals

Increase safety of ski cross courses by:

1. Optimized selection of course line
2. General decrease of the average speed
3. Sufficient control of speed before selective sections and features
4. Optimized selection of features
5. Sufficient protection placements
6. Optimized building and testing procedure

Increase quality of the ski cross courses by:

1. Creation of more passing sections by
   a. establishment of several variations of speed
   b. establishment of passing oriented sections
   c. creation of selective sections
2. Consideration of TV camera placements during the building
3. Optimization of the “Look and Feel” of the courses

2. General Characteristics

a. Slope (field of play)

- Must be inspected and documented in the summer inspection by FIS expert group
- Course Design must be proposed after the summer inspection by Course Designer and validated by OC & FIS officials
- Course Builder, Course Advisor and Technical Advisor should actively take part in the design work and implement these guidelines
- The Course Builder and Shaper should follow the validated Course Design unless restrictive snow conditions or other reasonable facts force a change
- Any proposed change needs to be approved by the Jury or a FIS official
- All terrain & all slope on the right and left site of the course needs to be prepared in order to allow stopping and recovering within a zone outside of the race line

b. Width of Slope

- Minimum 30 m (for very short and very safe sections, this may be reduced if required – for e.g. bridge crossing, flat straights. Sufficient protection installations must be in place.
- Appropriate width of the slope depends on the steepness of the terrain and the sufficient protection installations. The steeper the slope is, the wider it needs to be, to allow for sufficient speed control and sufficient protection installations
- If needed, summer ground work must occur to meet the specification of the general slope characteristics for ski cross

c. Length / Vertical Drop

- 1050 m +- 150 m (900 m - 1.200 m) / 215 m +- 35 m (180 m - 250 m)
- Exceptions can be made, need to be approved by the Jury or an FIS official

d. Steepness of the Ski Cross Course

- Average of 11° (+ - 2°) is recommended
- Flatter is often better as a guiding principle – it mostly offers the Course Designer more options

e. Speed

- Aim for an average speed of approx. 15-16 m per sec
- Control of the speed on the course needs to be established in areas between and before the main features to be able to control the speed by different snow / speed conditions

f. Landings (Zones)

- Every jump must have a sufficient landing zone in relation to the speed
- Landings should match or exceed take off angles and size of the jump in order to provide 'race effective' (i.e. no braking required) features
- Landings should be wider than take offs – approx. 1.5 - 2 times the width of take-off and allow safe and secure landing in relation to the jump size, type and given speed
- The knoll of any landing should be rounded (not sharp) to avoid the possibility of a double jump if competitors land on the flat before the transition
- A recovery zone before any netting of all landings is required
- Multiple landing options are encouraged to be built to help account for varying levels of skill between male and female, and best and less-skilled competitors

g. Spill Zones

- Spill zones must be planned for in course builds, adequately protected and with sufficient space between the race line and netting / padding / other obstacles
- Spill zones must be planned with the expectation that under 'race-pace' and in head-to-head environments, competitors might travel faster, higher, and further than a single individual on a track.

h. Recovery Space

- Recovery space needs to be planned for in course builds after every jump landing and every change of direction
- The distance between the features and protection nets must be sufficient to allow competitors the ability to regain balance and to continue to ski down the course or to stop if required. A consideration of the competitors skills and speed determines the space needed.

3. Specific Sections

a. Start Area

- Width min 30 m (just over start gate size)
- Large and flat enough to accommodate competitors and team staff

b. Start Section

- Minimum 60m before the first direction change
- Start straight must be wider than the start gate
- Start gate must be square to the first feature (equal distance from left/right gates)
- First direction change should be made once the field is reasonably split up, therefore technical features should be used in the starting section
- Start feature options / recommendations
  - Regular down ramp
  - Roller pack
  - Wu-tang
  - Step-up
  - Step-down
  - Waterfall
  - Gap to ramp
  - Ice cube style feature(step up-flat-step down or wu-tang-flat-step down)
  - Quarter Pipe drop in

c. 1st Turn

- Must be a minimum 60m after the start
- Must be a minimum 100 degree change of direction
- Must be made up of a minimum 2-panel corridor

d. Straightaways

- Longer distances are preferable to create passing opportunities
- May contain multiple feature options throughout straightaway
- Should vary as much as possible given available terrain – uphill, flat, across hill, angled, downhill etc.

e. Finish run-in

- May contain multiple features
- Should be of sufficient width to enable safe passing opportunities – ~30-50m
- Preferable incline of the slope is approx. 11-13 degrees **(adapt to presumable**)

f. Finish line

- Minimum width of the finish line (between timing beam installations and all other structures) should be approx. 16m
- There should be ca. 5m at each side, outside of the right and left site of timing units to any fence line

g. Finish area

- Width approx. ~ 30m
- Length approx. ~ 60m
- The finish area has to be flat, or could have an uphill incline without any compression

4. Specific Features

a. Rollers

- The distance between multiple rollers varies depending on whether they should be skied one at a time or doubled (tripled)
- If three or more rollers are constructed, the distance between the rollers shouldn't be identical to avoid a resonance effect
- Depth in between the rollers should be monitored. Semi-filled roller sections are generally much safer

b. Jumps / Kickers

- Pyramid approach or shape should always be aimed for bigger features
- The width of the landing for each jump must be wider than the take-off - approx. 1.5 - 2 times the width of take-off
- Need to be wide enough to allow all competitors to cross at the same time – approx. 8m
- The take-off must be capable of being skied on either side and off the front at low speed if required
- A skiable lane beside jumps should be established. It allows competitors to ski around features without losing speed in training and should be considered wherever possible
- The shape and the inclination of the inrun needs to be considered in respect to the entry speed and the available landing space
- Tops of certain type of jumps need to have a flat section in order to allow shaping of the jump from the top
- Kicker options / recommendations
    - Wu-tang
    - Spine
    - Rollers
    - Single
    - Double
    - Triple and more
    - On turn
    - Traditional rollers built with a machine – approx. 6m apart min required to allow for till depression
    - Flat top roller – usually hand shaped after being 'roughed-in' by machine
    - Cut-out/table-top roller – as for flat top roller above
    - Corner jumps
    - Step up
    - Step down
    - Table
    - Butter box

c. Direction changes

Bank

- Wide enough to allow overtaking
- Top of every bank needs to have at least 1 ideally 2 meters of width, in order to protect the bank with 1 - 2 B-nets)
- Entry of every bank needs to match to the line leading into the bank
- It should not be too close to the feature below to help manage the speed and the riders to rebalance
- The gate should usually be set up on the wall and not in the flat section of the bank
- The height of the bank needs to be sufficient to allow for passing opportunities
- Large, shallow banks are generally preferable, however, as with all of the features, variety is optimal and steep and high banks are also permitted
- Aim for a maximum of 3 bank-type turns per course

Flat Turn / Direction Gate

- Aim for a maximum of 1 GS type (single panel) turn section per course
- Gate setting should improve security and passing opportunities

Negative Turn

Corner Jump

d. Last Feature

- Must allow for competitors to complete landing and gain control before the finish line. The last feature does not have to be a jump
- The width of the landing must be wider than the take-off - approx. 1.5 - 2 times the width of take-off
- Finish feature (i.e. take-off) must be cantered, square to finish line, equal distance to left and right side to finish columns

5. Building Schedule

a. Course Line

Course Line must be inspected and documented in the summer inspection by FIS officials

b. Course Design

Course Design must be proposed after summer inspection by Course Designer and validated by OC & FIS officials

c. Course Building Schedule

Course Building Schedule must be proposed by OC and validated by FIS officials

d. Course Testing

Course Testing shall be performed before the 1st official training.

e. Course Maintenance

Features need to be established and built in a way, that a maintenance of the course in case of snowfall can be secured with the existing manpower (entry at sites of the course for cats e.g. to remove snow etc.)

f. Responsibilities Chart

Will be handed out and explained by FIS officials during the summer inspection

6. Further Requirements & Protection Considerations

Fences must be installed according to manufactures' specifications

a. Fencing A-net

- A-net can be used, if not other type of protection system can be established
- A placement of an A-net should be avoided if it avoids a secure spill zone

B-net

- Multiple where required (1, 2 & 3 line options)
- Must be placed on the top of banks

C-net

From top to bottom each side if needed in order to avoid outside entry to the course
Around start and finish area

b. Slide Skirts

- Use slide skirts for A-nets if possible
- Use of slide skirts needs to be considered case by case

c. Course Colouring

- Colouring should be done in discussion with Jury and the athlete rep and connection coach
- Colour needs to follow the contours of the course
- Colour must allow for a clear designation of the race track and be wide enough to accommodate 4 competitors side-by-side
- Colour must mark out very clearly all take-offs and landings

d. Access to the Course

- Sufficient C-fencing, or if necessary check by OC, must ensure that it is not possible to enter the course by non-accredited people/public