



FIS PARA CROSS-COUNTRY HOMOLOGATION GUIDE

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**INTERNATIONAL
SKI AND SNOWBOARD
FEDERATION**

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1 General

In general, the philosophy for FIS Cross-Country homologation, and the requirements and recommendations for FIS stadium and course design applies to FIS Para Cross-Country as well.

Important: Courses for the sit-ski categories cannot follow FIS Cross-Country homologation rules. The categories for A-, B-, C-climbs are different.

However, since certain classes and categories have clear physical limitations, the courses must in general be made easier, with special attention to fast downhill sections, sharp curves, and steep or long up hills. The following sections will describe areas within homologation work that specifically should be considered when designing courses for FIS Para Cross-Country athletes.

2 Classification

Para Cross-Country athletes are classified according to the following table:

Category	Class	Region Impairment	Main sport equipment and degree of impairment	
Standing	LW2	Impairments in one lower limb (ex. above knee)	Skiing with 2 skis and 2 poles	
	LW3	Impairments in both lower limbs	Skiing with 2 skis and 2 poles	
	LW4	Impairments in one lower limb (ex. below knee)	Skiing with 2 skis and 2 poles	
	LW5/7	Impairment in both upper limbs	Skiing with 2 skis and no poles	
	LW6	Impairment in one upper limb	Skiing with 2 skis and 1 pole	
	LW8	Impairment in one upper limb (ex. below elbow)	Skiing with 2 skis and 1 pole	
	LW9	Impairment in one upper limb and one lower limb	Equipment of choice, but with 2 skis	
	Sit-ski	LW10, 10.5	Impairments in both lower limbs (no sitting balance)	Using sit-ski
		LW11, 11.5	Impairments in both lower limbs (fair sitting balance)	Using sit-ski
LW12		Impairments in both lower limbs (good sitting balance)	Using sit-ski	
Vision Impaired	NS1	Light perception without measurable visual acuity or no light perception	Must ski with a guide Must wear blackout glasses	
	NS2	Visual acuity of LogMAR 2.3 - 3.5	May ski with a guide	
	NS3	Visual acuity of LogMAR 0.9 – 2.2 and/or binocular visual field of less than or equal to 60 degrees	May ski with a guide	

FIS Para Cross-Country Event Distances and Recommended Courses

The table below shows the standard event distances that are used at FIS Para Cross-Country World Cup, FIS Para Cross-Country World Ski Championships and Paralympic Winter Games.

Courses:	LW 10-12	800m, 2.0km, 2.5km, 3.0km, 5.0km
	LW 2-9 / NS 1-3	1200m, 2.0km, 2.5km, 3.0km, 4.0/5.0km

3 Para Cross-Country

Competition	Class	Gender	Total Distance		Course	Loops
CC Sprint Qualification (all) Semifinal NS1-3 (best 8) Semifinal LW (best 12) Final NS1-3 (best 4) Final LW (best 6)	LW 10-12	men	800 - 1000m	sit ski	400 - 1000m	1 or 2
	LW 10-12	women	800 - 1000m	sit ski	400 - 1000m	1 or 2
	LW 2-9	men	1200 - 1400m	standing	600 - 1400m	1 or 2
	NS 1-3	men	1200 - 1400m	standing	600 - 1400m	1 or 2
	LW 2-9	women	1200 - 1400m	standing	600 - 1400m	1 or 2
	NS 1-3	women	1200 - 1400m	standing	600 - 1400m	1 or 2
CC 5 km	LW 10-12	men	5.0 km	sit ski	2.5 km	2
	LW 10-12	women	5.0 km	sit ski	2.5 km	2
	LW 2-9	men	5.0 km	standing	2.5 km	2
	NS 1-3	men	5.0 km	standing	2.5 km	2
	LW 2-9	women	5.0 km	standing	2.5 km	2
	NS 1-3	women	5.0 km	standing	2.5 km	2
CC 10 km	LW 10-12	men	10 km	sit ski	2.5 km	4
	LW 10-12	women	10 km	sit ski	2.5 km	4
	LW 2-9	men	10 km	standing	2.5 km	4
	NS 1-3	men	10 km	standing	2.5 km	4
	LW 2-9	women	10 km	standing	2.5 km	4
	NS 1-3	women	10 km	standing	2.5 km	4
CC 20 km	LW 10-12	men	18 - 20 km	sit ski	3.0 - 5.0 km	4 - 6
	LW 10-12	women	18 - 20 km	sit ski	3.0 - 5.0 km	4 - 6
	LW 2-9	men	18 - 20 km	standing	3.0 - 5.0 km	4 - 6
	NS 1-3	men	18 - 20 km	standing	3.0 - 5.0 km	4 - 6
	LW 2-9	women	18 - 20 km	standing	3.0 - 5.0 km	4 - 6
	NS 1-3	Women	18 - 20 km	standing	3.0 - 5.0 km	4 - 6
Relay 2 x 2.5km classic + 2 x 2.5km free	mixed (335%)	classic	5km	sit ski	2.5km	2
		free	5km	standing	2.5km	2
	open (375%)	classic	5km	sit ski	2.5km	2
		free	5km	standing	2.5km	2

4 Course width categories

Course widths for competition formats should conform with the following table:

Category	Minimum course width			Used for
	Uphills	Undulated terrain	Downhills	
sit ski	3 m	3 m	3 m	Sit ski only (2 tracks) Relay classical technique
sit ski	5 m	5 m	5 m	Sprint, Pursuit (3 tracks)
standing classical	3 m	3 m	3 m	Interval start (2 tracks)
standing classical	5 m	5 m	5 m	Sprint, Pursuit (3 tracks)
standing free	6 m	6 m	6 m	individual, standing only (1 track along the side of the entire course)
standing free	9 m	9 m	6 m	Sprint, Pursuit, standing only (1 track along the side of the entire course)
sit ski + standing classical	3m	3m	3m	Interval Start, Relay (2 tracks)
sit ski + standing classical	5 m	5m	5 m	Pursuit, Sprint (3 tracks)
sit ski + standing free	3m + 6 m	3m + 6m	3m + 6 m	Interval start (2 tracks for sit ski, 1 track for standing)
sit ski + standing free	3m + 9 m	3m + 9m	3m + 9 m	Pursuit, Sprint (2 tracks for sit ski, 1 track for standing)

5 Standing and Vision Impaired categories

In general, the Standing and Vision Impaired categories can ski on courses that are very close to FIS homologation standards. However, design considerations in the following areas should be considered:

- Fast down hills with curves and corners that can be difficult and unsafe for Vision Impaired skiers
- Use of shorter loops such that Vision Impaired skier more easily can become familiar with the course
- Reduction of A-climbs (should be replaced by B-climbs)
- Range for TC should in general be in the low range (for example 150 – 180 m for 5 km)

6 Norms FIS Para Cross-Country courses

7.1 Norms for LW 2-9 / NS 1-3 (Standing and Vision Impaired) courses

The HD, TC and MC of the homologated competition courses should be within the following norms:

Course	TC	MC	HD	Hills
5.0 km	140 - 180	40	75	0-1 A hill, 4-6 B hills, 0-2 C-hills
4.0 km	100 - 150	40	60	0-1 A hill, 3-5 B hills, 0-1 C-hills
3.0 km	80 - 110	30	50	2-4 B hills, 0-1 C hill
2.5 km	75 - 90	30	50	2-3 B hills, 0-1 C hill
2.0 km	50 - 80	30	50	1-3 B hills, 0-1 C hill
1.4 km	0-60	35		
WC: In case the above-mentioned courses aren't available, the following courses can also be used.				
3.3 km	90 - 130	30	50	3-5 B hills, 0-1 C hill
3.75km	100 - 135	40	50	0-1 A hill, 3-5 B hills, 0-1 C-hills
7.5 km	200 - 250	40	75	0-1 A hill, 6-10 B hills, 0-2 C hills
10 km	250 - 350	40	75	0-1 A hill, 8-12 B hills, 0-2 C hills

7.1.1 A-climbs definitions:

A= Major uphill = PHD > 30 m, gradient 9 - 18 %, normally broken with some short undulating sections less than 200 meters in length or a downhill that does not exceed 10 m, PHD. Normally the maximum PHD should not exceed 80 m. The average gradient of an A climb including undulating terrain sections must be 6-14%.

7.1.2 B-climb definitions:

B = Short uphill 10 m < PHD < 29 m, gradient 9 - 18 %
B-climbs can also permit sections with gradients of less than 9% providing that the B-climb includes some sections with a gradient of 9% and the average gradient is > 6%.

7.1.3 C-climb definitions:

C = Steep uphill 4m < PHD < 10m, gradient > 18%.
Climbs with < 4 m PHD will be included as undulating terrain or as part of an A- or B-climb.

7.1.4 Undulating Terrain (UT): A combination of flat and rolling terrain including short climbs, flat sections and downhills. Terrain with gradient < 9 % and climbs < 10m PHD with gradient ≥ 9% can be included.

7.2 Norms for LW 10-12 courses.

The HD, TC and MC of the homologated competition courses should be within the following norms:

Course	TC	MC	HD	Hills
3.0 km	35-65	15	40	1 – 2 A hills, 2 – 4 B hills
2.5 km	30-60	15	40	0 – 1 A hills, 1 – 3 B hills
2.0 km	25-55	15	40	0 – 1 A hills, 1 – 3 B hills
800 m	0 - 30	15		
WC: In case the above-mentioned courses aren't available, the following courses can also be used.				
5 km	60 - 120	15	50	1 - 2 A hills, 3 – 6 B hills
3.75	45-70	15	40	1 – 2 A hills, 2 – 4 B hills
3.33 km	35-70	15	40	1 – 2 A hills, 1 – 3 B hills

7.2.1 Courses for the sit-ski category cannot follow FIS Cross-Country homologation rules due to the fact that sit-skiers have no use of their lower body, and push/pull themselves forward with poles from a sitting position (on their sledge).

The categories for A, B and C hills are therefore:

- A-hills 10 – 15 m PHD and gradient between 4 – 12 %
 - B-hills 4 – 9 m PHD and gradient between 4 – 12 %
 - C-hills 2 – 4 m PHD distance < 30 m long and gradient > 12 %, **maximum 16 %**
- Climbs with < 4m will be included as undulating terrain or as part of an A or B climb.

7.2.2 The following points should also be considered when designing courses for the sit-ski category:

- Sit ski courses should be placed on undulating terrain (not long flat courses) so that skiers have chances to rest. The 1/3 up, 1/3 down, 1/3 UT criteria applies equally to sit ski courses.
- up hills should in general not be steeper than **10 - 12 %** gradient
- A-hills should not be too long (**not over 200 m in length**)
- down hills should have straight run-outs preferably with a slight uphill to break the speed, the hills should not be steeper than 12 – 14 % gradient
- corners and turns should be placed where the speed is slow.
 - Corners on flat part of the course should optimally not be less than 90° angle (larger angle required for downhill corners). This applies in the stadium as well, for example for lapping. (NOTE: If you as a standing skier are poling without using the legs, the skis should easily follow the track both in curves/bends in flat parts and also in down hills – if we have to “work” with the legs, a sledge will have problems).
 - Banking to inside can help the skier make a sharp or a high-speed turn. Corners must not bank to the outside of the curve. 180° turning platforms at top of climbs must be flat and wide enough for passing.
 - Sit ski turns of 180° can be made at the top of climbs where speed is very low.
 - The minimum radius of a turn in a flat section or downhill section shall be 15m.
- Courses should be long and flowing and should not contain unnecessary sharp technical turns and steep uphill. A too technical course is a disadvantage to LW10/10.5.

- Courses must be flat from side to side through all sections (except on banked on corners)
- Junctions and merging zones require special placement and design and should occur in areas of lower speeds.

7 Stadium layout

In contrast to the newest development of stadiums and course layouts for FIS competitions, it is less important to ski through the stadium often, since most Para Cross-Country races are interval start races. Since Para Cross-Country events are divided into 6 categories (3 for men and 3 for women), it is difficult for announcers and spectators to follow the event if several categories are starting, passing through the stadium or finishing at the same time. For competitions with small fields, this situation can however be solved by letting each category finish the race before the next one starts.

A special consideration should be given to the transition and staging area for the sit-ski category. This should be provided with an easy and flat access to start & finish areas, with nearby covered and heated area for transition from wheelchair to sit-ski, as well as storage of wheelchairs out of the weather.

8 Contact

Para Cross-Country Race Director: Georg Zipfel (zipfel@fis-ski.com)

Para Cross-Country Coordinator: Elke Gundermann (gundermann@fis-ski.com)

Documents regarding the Homologation procedures and requests can be found here:
<https://www.fis-ski.com/en/inside-fis/document-library/cross-country-documents>