



Erasmus+



INTERNATIONAL
FEDERATION
for
SPINA BIFIDA
and
HYDROCEPHALUS



SKI4ALL PROJECT GUIDELINES



freerider
sport events

Definition of *disability*

Impairment

Externalization of a pathological status (temporary or permanent). Generally divided into 4 categories:

1. Physical impairments
2. Auditory impairments
3. Visual impairments
4. Systemic impairments

Disability

Each restriction or deficiency consequent to an impairment in the capacity of carrying on an activity or task in the ways or limits considered as normal for a person.

Handicap

Socialization of an impairment or disability. It reflects the social, cultural, economic and environmental consequences that derive from the presence of that impairment or disability.

Sport and Rehabilitation

Sport

All that games or exercises which have a sanitary, educational and aesthetic mean. Sport has to give way to entertainment. Everyone can find the valid motivation to approach to sport activities.

Rehabilitation

Every action which contributes to the physical, social and psychic reactivation of normal activities in the life of the individual. Referred to the individual in its entirety.

Sport and therapy

Sport, intended as a therapeutic moment within a specific rehabilitation plan, has the possibility of being employed both in hospital units and in external environments.

Ski for people with disability: HISTORY

- After the **Second World War** alpine ski spread around people with disability. Invalids of war and civilians tried to come back skiing, using prosthesis, crutches and other equipment invented and built by their own.
- **Austria:** homeland of alpine ski. **1948:** first documented competition for disabled skiers in **Bad Gastein**.
- **1970:** introduction of adapted sleds, mono-ski and ski-bob. Alpine ski became practicable by paraplegic and other wheelchair users.
- **1976: Sweden** held Paralympics Winter Games with both males and females competitions of giant and special slalom.
- **1982: Switzerland** held the first Para Alpine Skiing World Championships with competitors with disability; this event is repeated every four years.
- International agonistic activities are organized by the **International Paralympic Alpine Skiing Committee (IPASC)**, which depends on the **International Paralympic Committee (IPC)**, established in **1989**.

CLASSIFICATION

The International Paralympic Committee (IPC) distinguishes alpine skiers into groups on the basis of their disability and the degree of disability.

Groups are adapted from time to time.

Deaf people and people with mental disabilities have their own races:
Special Olympic Games.

Visually impaired people have a guide who ski in front or behind the athlete, giving them instruction via radio.

- B1: blind
- B2: severe visually impaired
- B3: visually impaired with good residual capacity

Blind people use normal ski equipment and compete accompanied by a guide. For blind people is foreseen a connection through intercom or the use of a megaphone.

Standing category

These athletes can ski both with a ski with two external supports or with a prosthesis on two ski. If without arms, they do not use snow rackets.

- LW1: amputees above the knee
- LW2: skiers who use stabilizers
- LW3: amputees of both limbs below the knee
- LW4: skiers with prosthesis
- LW5/7: skiers without snow rackets
- LW6/8: skiers with a snow racket
- LW9/1: disability of an arm or leg (post-amputation)
- LW9/2: disability of an arm or leg (cerebral palsy)

Sitting category

These athletes use a specific device called *mono-ski* constituted by a seat and a suspension, mounted on one or two ski and two lateral supports.

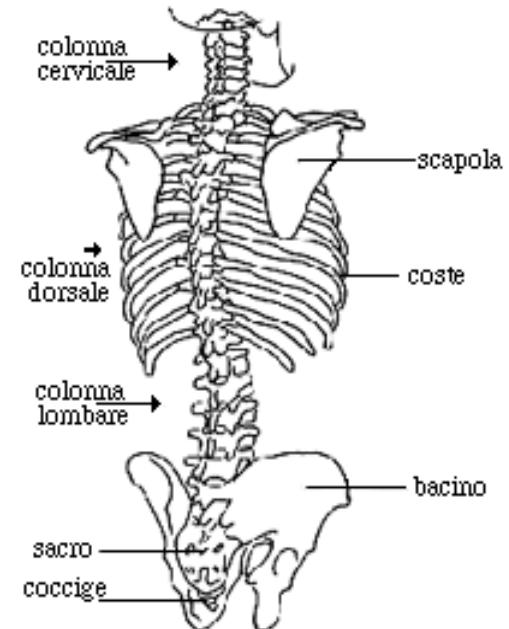
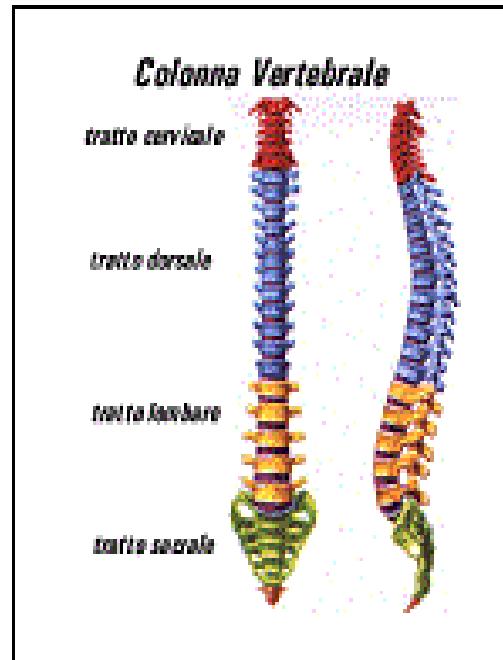
- LW10: mono-ski (high degree of paraplegia)
- LW11: mono-ski (lower degree of paraplegia or amputee of both limbs above the knee)
- LW12/1: mono-ski (lower degree of paraplegia)
- LW12/2: mono-ski (amputees of both limbs below the knee)

SELECTION PHASES

- a) Doctor's visit (physiotherapist or another clinician recognized by IPC).
Aim: to document the physical capacities of the athlete for a specific competition.
 - For wheelchair users neurological deficit are a crucial factor.
 - The degree of visual impairment is determined from an ophthalmologist. Blind people are often obliged to wear ski glasses completely darkened.
- b) Distribution of the athletes to a specific category.
 - Those cases who are difficult to place, are classified after competition observation.
- c) If within some categories there are few participants, organizers can decide to incorporate them.

The Spinal Column

- Central support of the body, constituted by 33-34 *vertebrae* (vv.) of different shapes according to the tasks performed.
- Distinction of 5 regions:
 - *Cervical region*: 7 vv. that support the head and permit its movements.
 - *Thoracic or dorsal region*: 12 vv. on which ribs articulate and form the ribcage.
 - *Lumbar region*: 5 bigger vv. than the others, because they support the majority of the body weight when in upright position.
 - *Sacral region*: 5 vv. welded together to form the sacrum on which the bones of the pelvis articulate.
 - *Coccyx*: 4-5 vv. welded together and extremely small.



The Nervous System

Divided into **Central Nervous System (CNS)** and **Peripheral Nervous System (PNS)**.

- CNS composed by:
 - *Brain or encephalon*: contained within the skull, connects the spinal cord and the cerebellum, covered by 3 membranes named *meninx*.
Task: it elaborates the information coming from the body and the environment triggering chemical, motor and behavioural responses processes through 100 billion *neurons*.
 - *Spinal cord*: has a flattened cylindrical shape, it extends from the first cervical vv. to the second lumbar vv. (total length of 45 cm).
Task: to collect environmental stimuli and transmit them to the cerebral cortex and then to the periphery.
- PNS:
 - 31 pairs of *spinal nerves* whose roots are divided into an anterior part (or motor) that conducts stimuli coming from the brain or the spinal cord towards the muscles; and a posterior one (or sensitive) which conveys the stimuli from the periphery of the body to the CNS.
 - 12 pairs of *cranial nerves*.

Spinal Cord Injury

- *Partial or total interruption of the functional connections between superior centres of the CNS and peripheral nerves.*
 - Major consequences: lack of connection between nervous fibres (paralysis), loss of control of bowels, loss of the functionalities of the reproductive apparatus, lack of sensibility.
- The lesion can be *complete* with a total and permanent lack of the capacity of sending sensory and motor impulses or *incomplete* with a partial damage of the spinal cord which varies from individual to individual and depends on the area of the spinal cord damaged (anterior, posterior or lateral).
- Most common causes: *traumatics*.

Paralysis

→ Loss of functions after a damage of the nervous system.

- Two different situations:
 - *Paraplegia*: a total or partial paralysis which hits the lower limbs and the trunk (from the T1 vertebra down). T1/T12 lesions hit legs and trunk, L1/L5 from waist down.
 - *Quadriplegia*: a total or partial paralysis from the neck down. A mechanical ventilation could be necessary.
- According to the type of damage that affects the spinal cord:
 - *Spastic*, when the spinal reflexes are functioning but impulses from the brain do not work properly (violent and unexpected spasms).
 - *Flaccid*, when spinal reflexes are not active (loss of muscle tone in the limbs, in the bladder and bowel).
- Others conditions that can lead to paralysis are stroke and multiple sclerosis.

Issues connected to various pathologies

Issues put into stress during ski for people with disabilities:

- **INCONTINENCE:** inability of retaining urine and faeces, due to an alteration of nervous mechanism which permits the voluntary control of sphincters (application of a catheter). Essential are the period and places to ski in order to avoid infections or related issues.
- **BEDSORES:** skin covers all the body and it protects other tissues working as a barrier against the microorganism, water and chemical agents. It is also involved in the control of the body temperature and in maintaining a good level of hydration. Due to the severity of the spinal cord injury, some sensory information which come from the skin could be blocked causing a loss in the perception of touch, pain, pressure or temperature gaps. People could become more vulnerable to burn or sharp surfaces, increasing the possibility to develop bedsores and blisters, caused by a prolonged immobility of the individual provoking a reduction of the quantity of blood in the areas exposed to pressure.
- **BLOOD CIRCULATION AND THERMOREGULATION:** given that the voluntary movement of limbs is altered or absent, the so-called *muscle pump* is lacking causing a stagnation of the blood and other liquids in hands and feet. External rigid temperatures in the mountain could facilitate frostbites. After a spinal cord injury, the control of the body temperature fails because of the impossibility of eliminating the heat in excess, situated at an under-injury level.

Tips

It could be useful to bear in mind some of the following tips:

- The choice of the place to go skiing must always consider the accessibility for people with disability.
- The possibility of reaching a place (a lodge) in which toilets and/or heating are present.
- To evaluate and suggest a suitable clothing adequate for the meteorological situation with a particular attention to wet garments.
- To evaluate the strength of the person and consequently pushes him/her to continue or decide whether to interrupt the lesson.

The right movements for teachers

Other tips for ski teachers who deal with people with disability and follow their movements, in order to avoid unnecessary efforts, pain and guarantee safety to both!

1. Totally passive person: relieved by one or two teacher(s).
2. Partially active person: involve his/her residual motor capacities.
3. Teachers have to keep lower limbs flexed and feet well-extended for a better support basis, assuming working positions that safeguard their back.
4. Teachers have to be able to place their hands in specific grip points to consent safe movements.
5. To assist a wheelchair user in going down the stairs or in the snow, teachers have to stay behind the wheelchair and tilt back it of 45°!



Paraplegic



Quadriplegic (C6-C7)

Active skiers equipment:

- Uniski/mono-ski
 - Dualski
 - Kartski
- Specific stabilizers for standing



Amputee

Passive skiers (Ski therapy) equipment:



Complete
quadriplegia



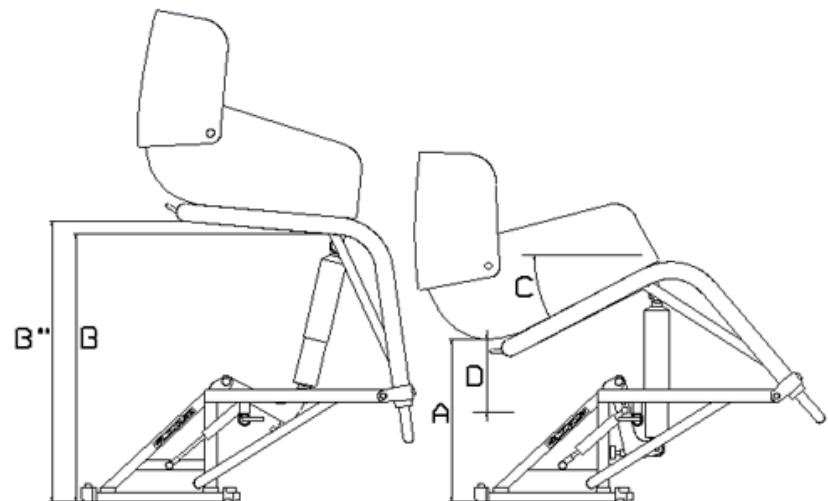
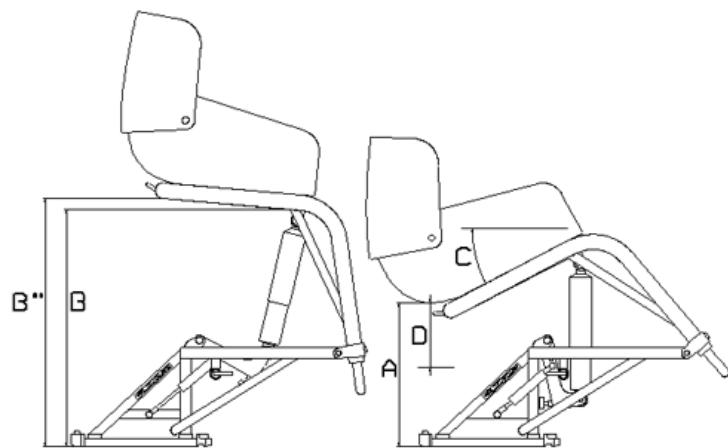
- Tandem-ski
- Dualski-piloted

Active skiers

Mono-ski/uniski



Dualski/Tempo Dualski



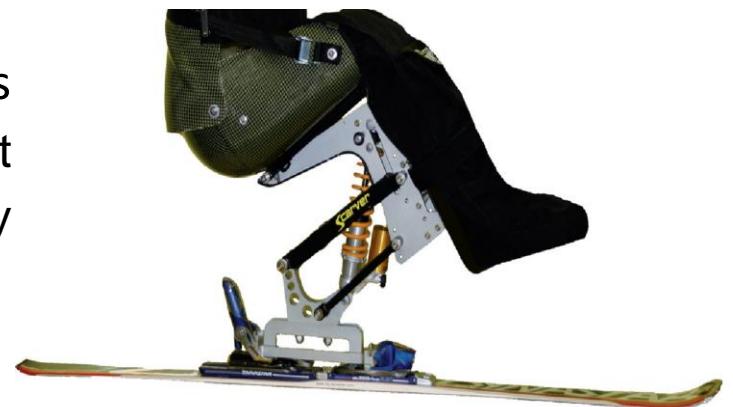
Uniski and Dualski

The sitting skier learns how to turn and how to control his speed for his total autonomy on the snow in a fast way.

- It can be equipped, optionally, by an air or spring shock absorber;
- Two configurations: low (for beginners) and high (for advanced level);
- It is comfortable and very easy to use on chairlifts
- Possibility to pass from uniski to dualski just changing the lower part of the frame.



A particular type is the **SCARVER**, that has many regulation possibilities (3 different positions) and it is a highly stable system easy to use.



Stabilizers

Superlite



Comfort



Posture

A good posture corresponds to a proper skeletal alignment without overloading articulations or feeling pain.

The proper posture on the mono-ski:

- **proper height of the seat-back according to the injury of the person;**
- **using a “slow memory” material pillow;**
- **fasten the containment belt;**
- **regulating the inclination of the seat-back with shoulder perpendicular to the center of fastening;**
- **positioning legs in balance with the trunk;**



Kartski/SnowKART

For people who can use upper limbs with low balance

Kartski is indicated for people who want to ski autonomously, who can use upper limbs but they do not have enough balance.

Sitting skiers can easily control by their own Kartski, skiing on easy ski slopes. The ski coach can use a rope to control the speed increases of the skier.



Passive skier

Tandemski/
Tandemflex



Tempo/Dualski Piloted



Tandemski/ TandemFLEX

For not autonomous people

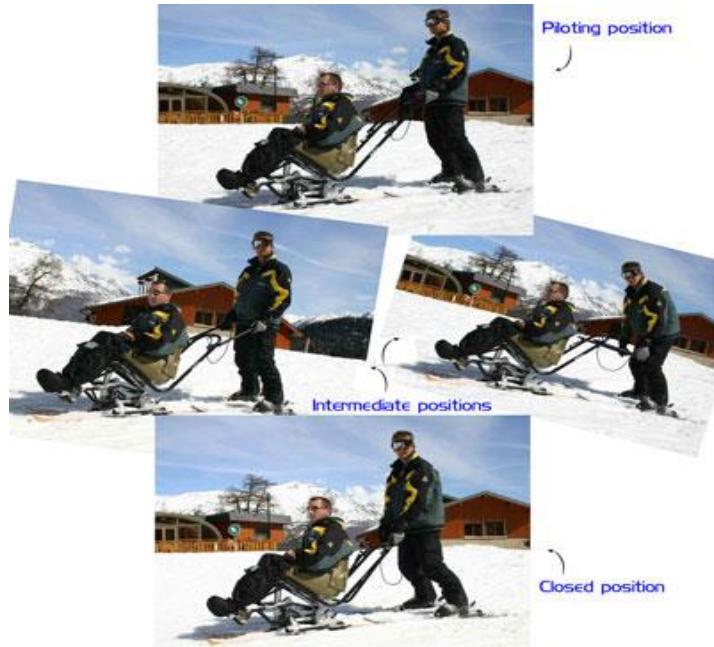
- At all ages, weight and people with any disabilities, also for those without any body autonomy.
- After a specific and compulsory training.
- Pleasure is shared between the driver and the passenger with a real feeling of snow slipping by the passenger.



Dualski Piloted/tempo DUO

For partially or completely not autonomous people

- For people without mobility or with partial mobility in the upper part of the body
- Sitting skier can be active having the feeling of an autonomous skiing
- Very comfortable thanks to the adjustable suspensions
- The learning of the technic is quite fast. The choice of the ski slope should be made according to the skills, the technical level, the strength and the weight of the sitting skier.



Shock absorber

Functions: absorbing the roughness of the ground, monitoring the change of load on the device, facilitating the bending at the end of the turning, comfortable for skiers. Personalized shock absorber according to the weight of the users, the ground and the type of snow.

Two types of shock absorbers:

- hydraulic spring-loaded shock absorber: most used is that conceived by **OHLINS** factory. Sophisticated system, advised especially for competitions. It works in an hydraulic way and with gas pressure.
- air/oil shock absorber: can be used by any skiers of all levels. It is an oil shock absorber with a pump inside functioning with air.



Ski lift systems

Created and approved to follow the barycenter of the skier in any situation, keeping him in balance and to avoid the overturning also in case of incorrect hooking of the sitting.

Structure:

1. a semi-rigid ring to allow a fast hooking;
2. a slipknot tight the ring around the disc or the anchor;
3. two different ropes that guarantee a secure release also in case of falling (main rope/security rope).



Lesson planning

1. Choice of materials and explanation of the equipment used (mono-ski, dualski and complementary equipment, stabilizers, posture).
2. **Acclimatization** (to get confident with the snow, the equipment and the sense of slipping and choice of the ski slope).
3. **Exercises on the snow:**
 - Let oneself slipping pushing with the stabilizers
 - Rotation of the trunk from standstill
 - Lateral movements and lifting up on stabilizers
 - Use of the ski lift
 - Instruction for a proper entourage

Bronze Level

BASIC

Aims: to get confident dropping off a descent in total security checking the speed through a sequence of change directions.

Descent: school camp or a very easy descent ground, possibly with initial and final part in a flat surface.

Skills to develop:

- Keep one's balance;
- Control of the speed;
- Change of direction.

ADVANCED

Aims: to realize several bends progressively reducing pressure on stabilizers.

Descent: slight slope

Skills to develop:

Change of directions

Silver Level

BASIC

Aims: know how to make several bends with continuity of action checking the speed and handling progressively the pressure of the stabilizers.

Descent: slight or medium slope

Skills to develop:

- Pressure on stabilizers;
- Management of the edge;
- Ski guide action;
- Management of the bending - trunk's extension

ADVANCED

Aims: know how to realize several bends creating a progressive reduction of careening with an appropriate driven action with different times and rhythms.

Descent: medium slope, also steep ones (red slopes)

Skills to develop:

- Translation (active edge)
- Addressing of the ski
- Adaptation to different bending arches

Gold Level

BASIC

Aims: know how to realize several bends with different arches and on any kind of slope.

Descent: from medium or easy to the most difficult taking into consideration the arch of bending, optimal progress speed, technical skills and psycho-physic condition of the skier. Red-black slopes.

Skills to develop:

- Maintenance of centrality
- Increasing of the coordination (stabilizer's skate parallel to the snow)
- Adaptation to different bending arches

ADVANCED

Aims: know how to realize several agonistic bends with good speed, different bending arches.

Descent: from medium-easy to the most difficult on any kind of snow.
Slopes: red-black

Skills to develop:

- Improvement of the movement (agonistic basic bend from diagonal to downstream)
- Management of centrality in speed (stabilizer's skate parallel to the snow)
- Adaptation to different bending arches

ITALIAN SKI BASIC PRINCIPLES applied to the teaching to disabled people

MAIN TECHNICAL TERMINOLOGY

TAKING OF THE CORNERS: angle of incidence from the ski to the ground.

ANGLE: shift of the longitudinal axe on the transversal axe of the pelvis: the chest compensates using all the muscles. It might be: **STATIC** or **DINAMIC**.

STEERING ACTION: rotation of the bottom of the mono-ski to allow the ski change of direction.

MOVEMENT DIRECTION: when the centre of the mass is directed all along the direction of the curve trajectory.

BODY ORIENTATION: rotation of the body around the longitudinal axe. It always starts from the upper part of our body (sight).

MODULATION: ability to release the muscular tension over time.

BASIC POSITION: position in which our body reaches a natural balance.

TRANSLATION: movement-shift of the centre of mass. Used in the corner shift to realize a bending.

CLOSURE MOVEMENT BENDING: point where the centre of mass is moving from the previous bending to the following one.

CLOSURE GEOMETRICAL BENDING: point where ski end the previous bend and start the following one.

CENTRE OF GRAVITY: body's centre of balance.

CENTER OF MASS: central point of strength

CENTRALITY: balance in any situation

BALANCE: state of a body. It could be: **STATIC** (stable) or **DINAMIC** (unstable)