



# ALPINE OFFICIALS' MANUAL

## CHAPTER VII

### THE RACECOURSE

SEASON 2024

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## OVERVIEW

U.S. Ski & Snowboard and the International Ski & Snowboard Federation (FIS) take an active role in providing information, instruction, guidance, and direction to organizers at all levels of ski competition.

Because of the rapidly changing nature of equipment and competition, it is necessary for each official to know, understand, and abide with *current* editions of the U.S. Ski & Snowboard Alpine Competition Regulations (ACR), the FIS International Ski Competition Rules (ICR), and their Precisions as well as additional rule books applicable to the sport as published by U.S. Ski & Snowboard and/or the FIS Office.

The ACR, the ICR, and its current Precisions as well as any bulletins issued by U.S. Ski & Snowboard and/or the FIS Office supersede any information contained in any Chapter of this Alpine Officials' Manual. For U.S. Ski & Snowboard non-FIS events, the ACR is used, however, *“The FIS International Ski Competition Rules (ICR) and adjuncts shall govern any and all issues not addressed therein.”* For FIS events, the ICR rules supersede the ACR.

## THE RACECOURSE

The essential element in any alpine ski race/event is the *“racecourse”* commonly called the *“course,”* or, to make the more specific European distinction - the *“piste,”* which is the trail or slope, where the competition is set, and the *“track,”* which is the sequence of gates through which the competitors pass.

The goal is to achieve a well-maintained racecourse/track that is not only legal but is also fair for all competitors. To these ends, the rules specify “dimensions” which include the minimum and maximum vertical drop; the minimum width of the racecourse; the number, width and separation of the gates; and necessary manual/hand timekeeping and homologated electronic timing systems and procedures.

## RULES PERTAINING TO THE RACECOURSE AND THE “TRACK”

Most matters relative to the “racecourse” are treated under specific event sections of the ACR, the ICR, and its current Precisions. Rule reference numbers are not listed in this Alpine Officials’ Manual as they may change with each publication of the rulebooks. Check the applicable Index for section numbers for the following items:

- Supervision of the Training
- Rights of the Jury During Competition
- The Start
- The Finish
- Homologation
- Preparing the Downhill racecourse, and its “dimensions”
- Preparing the Slalom racecourse, and its “dimensions”
- Preparing the Giant Slalom racecourse, and its “dimensions”
- Preparing the Super G racecourse, and its “dimensions”
- Preparing the Parallel racecourse, and its “dimensions”
- Preparing the racecourse and the “dimensions” for Youth International Alpine Competitions
- Inspection and Training (on the racecourse)

The rulebooks contain various instructions regarding the racecourse - evidence that this part of alpine ski racing continues to evolve at a relatively rapid rate. Because of the nature of this subject and its impact on the success of a race, it is best to view the racecourse from the point of view of the objectives involved and the importance of meeting those objectives.

The rulebooks may be viewed and downloaded from the following websites:  
[usskiandsnowboard.org](http://usskiandsnowboard.org) and [fis-ski.com](http://fis-ski.com)

A properly prepared racecourse is essential for a good race. An ideal racecourse should be prepared and maintained so that all competitors have equal opportunities regardless of their start position. It takes knowledge, experience, and dedication to be able to adapt racecourse preparations, setting, and maintenance to the varying conditions presented by different sites, different fields, and unpredictable weather.

During the race, equipment, clothing, supplies, etc., not in use must be secured and off the hill; “Clean Hill Initiative” is the goal. When not being used, drills must be in holsters; coaches and Gate Judges must place equipment, clothing, and backpacks, etc., outside the fencing. After the race, the hill should be left clean of equipment and debris.

On-hill security/protection installations require specific knowledge and experience and should follow this creed: **ADA**

- **A**void the obstacle
- **D**eflect a fallen competitor away from an obstacle
- **A**bsorb the energy to stop a fallen competitor before the competitor reaches the obstacle.

FIS names technical advisors to some competitions, e.g., World Cup and Continental Cup, to work with the organizers in advance of the competition to review and prepare the condition of the racecourse and verify the availability of necessary competitor security/protection equipment. U.S. Ski & Snowboard has named officials charged with similar duties; contact U.S. Ski & Snowboard Competition Services for information.

### **FIS RACECOURSE HOMOLOGATION**

Alpine ski competitions appearing on the FIS Calendar are to be held on racecourses that are homologated (inspected and approved) in advance by the FIS. This helps assure the quality and legality of FIS races, provides for consistency between sites, and offers race organizers an opportunity to receive input from acknowledged experts.

A request for homologation is to be directed to U.S. Ski & Snowboard Competition Services. At the time of the request, the race organizer or ski area should provide basic information regarding the trail and its intended use, the proper contact people at the site, and the current state of preparations.

FIS Downhill and Super G racecourses must be re-homologated every 5 years. FIS Slalom and Giant Slalom racecourses must be re-homologated every 10 years. The homologation is valid from 1 November of the year of issue of the homologation certificate.

All racecourses – Downhill, Super G, Giant Slalom, and Slalom – must be re-homologated whenever there have been major modifications to the hill including, but not limited to: Erosion; landslides or overgrowth; construction of buildings or lifts; construction of shelters, parks, roads, tracks, etc.; installation of snowmaking hydrants, snow retention fences, or other significant hardware.

**NOTE:** A race organizer should not depend entirely on the homologation of a racecourse and ignore exceptional snow and weather conditions. Natural conditions like insufficient or excessive snow depth, unfavorable surface snow conditions, dense fog, heavy snow fall or rain may make the trail unsuitable for holding a specified competition.

FIS homologation/course approval data which does not include maps, photos, etc., is available on the FIS website at: [fis-ski.com/DB/alpine-skiing/homologations.html](http://fis-ski.com/DB/alpine-skiing/homologations.html)

### **U.S. SKI & SNOWBOARD RACECOURSE HOMOLOGATION/APPROVAL**

All sanctioned U.S. Ski & Snowboard Downhill (DH), Super G (SG), Giant Slalom (GS), Slalom (SL) and Parallel (P) events, both scored and non-scored and including Masters, are to be conducted on approved racecourses. Racecourse setting needs to conform to the inspection report and requirements.

All FIS course homologations supersede U.S. Ski & Snowboard course approvals, provided no major changes have taken place on the racecourse and re-inspection is current. Non-FIS, scored events run on these racecourses must meet published minimum vertical drop or minimum time standards. The minimum time standard for a 2-run event is based on combined time.

If a U.S. Ski & Snowboard non-FIS, scored event meets the required vertical drop, no further action is required. If the required vertical drop cannot be met but the minimum time standard can, the higher of the calculated penalty or the current FIS ENL minimum penalty of 60.00 must be applied. If a U.S. Ski & Snowboard Downhill, Super G, Giant Slalom, or Slalom meets neither the vertical drop requirement nor the minimum time standards, in order to be scored to the U.S. Ski & Snowboard Points List, the calculated penalty must be adjusted accordingly. The higher of the adjusted penalty or the minimum penalty of 60.00 must be applied. Refer to the current Alpine Competition Guide for these adjustment requirements.

Vertical drop requirements must be met for all FIS events. If not met, the event may either be changed to the FIS ENL category or may not be scored.

U.S. Ski & Snowboard Downhill and Super G racecourses must be re-approved every 5 years or when major modifications are made to the hill. U.S. Ski & Snowboard Slalom and Giant Slalom racecourses must be re-approved every 10 years or when major modifications are made to the hill.

### **U.S. SKI & SNOWBOARD RACECOURSE INVENTORY**

The U.S. Ski & Snowboard Alpine Office and the Alpine Courses Working Group have developed an inventory of racecourses used for U.S. Ski & Snowboard events. The intention of this program is to assist race organizers with their concerns.

Complete homologation/course approval reports including maps, photos, etc., are available on the U.S. Ski & Snowboard website:

[media.usskiandsnowboard.org/CompServices/Homologation/](http://media.usskiandsnowboard.org/CompServices/Homologation/)

Login is required. **User ID = homologation; Password = Allout2022!**

**NOTE:** The U.S. Ski & Snowboard and FIS websites – not paper copies or independent websites – are the only valid sources for verification of a course homologation.

**NOTE:** A new inspection of an existing course (FIS or National) voids the previous homologation of an existing course.

### **PERSONNEL**

The Chief of Course is the official responsible for preparing the event arena, working with Course Setters, and supervising the cleanup immediately following the event. Successful completion of these responsibilities requires organization, leadership, communication, personnel, and equipment.

The Chief of Course needs to establish advance communication with ski area management. In fact, at many major events where the ski area is involved with organization, the Chief of Course is often affiliated with the resort and is generally the “local authority” regarding area weather patterns, ski area resources, and existing snow conditions.

A Chief of Course needs to know racecourse and snow preparation and should be able to evaluate the racecourses set under their jurisdiction. Their responsibilities include the start and finish areas – including timing installations – as well as the actual competition trail.

In addition to responsibilities to the Race Organizers, a Chief of Course should know and understand the rules and participate in Jury inspections and other Jury meetings. As the Referee is the liaison between the coaches and the Jury, the Chief of Course is a liaison between the resort’s mountain operations and the Jury.

Refer to Chapter IV - Race Organization, for suggestions for an “Event Personnel Assignment Sheet” and a “Check List for Event Organizers.”

### **COURSE WORKERS/VOLUNTEERS**

A critical aspect of working “between the fences” at any ski competition is that personnel need to be properly trained and equipped for their tasks. Not only is reasonable skiing skill necessary to perform work in this challenging environment, but the ability to maneuver competently on steep slopes while carrying equipment and materials, including 50-pound bags of snow hardening agents, is a key requirement. Individuals’ skiing ability should be verified prior to their being assigned to specific tasks, especially in extreme/technical areas or in course sections that are steep or icy.

Training on proper use of racecourse maintenance equipment is critical. Training on use of shovels, rakes, color/dye packs, and other materials should occur prior to race day. All course workers should be under constant supervision by trained and experienced crew leaders. *Radio communication with course crew leaders is critical.*

Awareness of details will improve the chance that racecourse work proceeds with a greater margin of security. Some of these details include:

- Daily Program (schedule), including training, inspection, forerunner start times, and racer start times
- Racecourse inspection techniques authorized for competitors,
- Start intervals for competitors
- “Start Stop” procedures (Refer to Chapter III. Rules, Jury, and Technical Delegate)
- Location of staging areas, e.g., replacement poles and/or equipment

### **LIST OF SUGGESTED RACECOURSE MATERIALS**

The equipment and supplies needed to conduct an alpine ski race depend on many factors. The type of event; the number, age and ability of competitors; the nature of the racecourse; the number of workers available; as well as the snow conditions and weather may all make a difference in the supplies you will need. For example, Downhill, Super G, Giant Slalom, and some Slalom events will require additional fencing and security/protection systems.

If the snow is soft or layered or if it has a crust, shovels and rakes will be needed to keep the track in competition condition. In a Slalom, replacement poles and extra tools will be needed. “Self-redressing” poles require certain tools and personnel. Additional gate panels must be available as needed. All tools and materials should be in place at the racecourse well in advance of the start of an event. It is advisable that “caches” of equipment be placed along longer racecourses to speed repair and replacement.

Gate Poles:	Wrenches (if screw-in gates are used)
GS racecourse in adequate numbers	Wedges, hammers
SL racecourse in adequate numbers	Shovels and rakes
Tool kit (pliers, screwdriver, etc.)	Communications equipment
Barriers/Signage: As needed	Extra radio batteries and chargers
Drills/Auger for hard snow/ice	Snow hardening agents
Drill battery chargers/extra batteries	Buckets and spreaders
“Willy bags” & filling	Rope/pennants for crowd control
Air fences and inflating devices	Course coloring agent & sprayers
Tags or stickers for numbering gates	Plastic garbage bags
“Zip” ties	Heavy twine/baling wire
Tape - duct, electrical, friction, etc.	Timing equipment: electronic & manual/hand
Gate panels: DH/GS/SG	Finish Sensor protection devices
Banners: Start, Finish, Sponsors	Official Notice/Score Board(s)
Support for banners	Public Address System

### **THE START AREA**

The start area is an integral and important part of the racecourse and care should be included in its planning and preparation. The exact location of the start gate and the start ramp should be well considered so that it leads competitors logically and smoothly onto the racecourse through the first gates. The track from the start line to the first gate should be prepared as well as the rest of the racecourse.

The preparation area should be closed off from the public and it should be either sheltered or near shelter. It should have sufficient area for competitors, coaches, and service representatives. It should have a place to leave extra clothing and should have an exit other than through the start gate.

The start gate should be constructed with posts 50 cm to 80 cm apart. The wand must also be within this range so a competitor cannot go through the gate without triggering the timing equipment. The posts need to be firmly fixed so they do not work loose and should be constructed so that a competitor cannot use the start gate to push off or pull out of the start.

The start wand should be attached so that the competitor hits the bar below the knee and not too close to the boot top. In all cases, it shall not be less than 35 cm or more than 50 cm above the surface of the snow. It may be mounted either to the right or left of the starting competitor, and its exact position and rotation on the posts must be marked.

Unless a start wand breaks, it may not be changed during a run. If a start gate requires replacement during a run, it must be replaced with an identical start gate in the original position and with the same rotation.

Special attention must be paid to preparing the surface below the start gate where competitors place their ski poles. It is best to ice in starting pads at the snow surface, so the area does not deteriorate throughout the race creating a disadvantage for competitors who start later in the field.

### **THE FINISH AREA**

For a major race, in addition to media, spectators, and competitors, there may be 15-20 coaches and race officials present immediately outside the finish area. For the functions of the finish area to be effective, a location should be chosen which conforms to current requirements of U.S. Ski & Snowboard and FIS concerning width and vertical drop of the racecourse above it. The finish area should provide an area of sufficient length and width that competitors can stop after crossing the finish line in racing fashion and should provide access/egress for both officials and competitors. The finish area should also have space allotted for functions that take place adjacent to the finish area including timing, scoreboard, media, and spectator viewing.

The last gate should be open and direct the competitor to the middle of the finish line, and the finish line must be clearly marked horizontally with a coloring substance. The finish area should be prepared and maintained as well as the rest of the racecourse.

The finish line is marked by two poles or vertical banners which may be connected by a horizontal banner. In Downhill and Super G races, the finish must be no less than 15 m wide and in Slalom and Giant Slalom no less than 10 m wide. The width is considered to be the distance between the two finish posts or banners not the length of the finish line. The supports used to mount the timing devices must also be at least this far apart. The timing supports can usually be placed behind the finish poles (or banners), on the downhill side and suitably protected to avoid increased risk.

Finish installations and closures should be set up or secured through suitable protection measures so the competitors are protected as well as possible. Attempts should be made to avoid allowing situations to arise/occur that go beyond the inherent risk of the sport.

## THE “TRACK”

Course Setting is acknowledged as an art - not a science - and cannot be easily taught or explained. The course setting specifications for each event are defined by U.S. Ski & Snowboard and FIS rules. However, experience is critical to good course setting and should be recognized in the selection of course setters for each event.

Vertical drop requirements, gate specifications, and other instructions regarding the track appear in current copies of U.S. Ski & Snowboard and FIS rules in specific sections for each event. Vertical drop requirements and special time requirements for U.S. Ski & Snowboard events appear in the current ACR. These regulations are also available on the U.S. Ski & Snowboard website. In order to guarantee Officials are using current specifications, these specifications are not listed in this Chapter.

U.S. Ski & Snowboard and FIS rules contain a “Job Description” for the Course Setter. The articles that detail this job description include nomination/assignment and prerequisites, supervision and subordination, and the rights and duties of the Course Setter. It is strongly suggested that Course Setters take the time to familiarize themselves with the documented requirements contained in the respective Homologation Report prior to setting a course.

The Course Setters answer to the Jury of the particular competition. They need to follow the directives of the Jury and, if the racecourse has been set prior to the Team Captains’ meeting, they are required to make a report at the Team Captains' meeting concerning the course set. In order to set a course appropriately, the course setter must respect the terrain, the snow cover, and the ability of the participating competitors.

Depending on the age group of the participating competitors or the level of competition, racecourses are required to be set within U.S. Ski & Snowboard and FIS specifications regarding the number of gates, the width between the poles of each gate, the distance between successive gates, and the restrictions applied to vertical combinations (flushes and hairpins). In general, racecourses should have rhythm and the preferred line should be obvious.

The challenge to the competitors should not be in memorizing the racecourse but in selecting the best line in the racecourse set. Course Setters should not rely merely on complex combinations of poles, as a selection of a general line that will test a variety of normal racing skills is the first objective.

Racecourses should be technically challenging, and the gates should require competitors to make complete turns. A racecourse should have a variety of turns with varying radii in and out of the fall line and skillful use of the terrain, especially for Giant Slalom. The final gates of a racecourse should lead the competitor through the center of the finish gate, and Course Setters should anticipate setting into the finish several gates before the end of the racecourse.

The Course Setter should check to see that poles are set in firmly to the proper height. Assistants need to be available so that the Course Setter may concentrate on setting instead of carrying poles.

Downhill and Super G Course Setters should meet with the Technical Delegate and the Organizer at least one day before the training begins to discuss the racecourse and any possible alterations.



Downhill Course Setters must be acquainted with the particular racecourse. Laying out a trail and setting the racecourse for Downhill races that are legal and fair for all competitors requires particular knowledge, skill, and experience. The Course Setter needs to consider the possible effects of a change in weather as temperature changes may affect racecourse conditions.

In Downhill and Super G, gate panels need to be fastened according to manufacturer and FIS specifications. It is critical to have qualified personnel *who are not entered in the competition* test Downhill racecourses and assist the Course Setter with fine-tuning of the racecourse by running all or part of the racecourse the day before the official training begins.

Giant Slalom racecourse setting should conform to current specifications of the rules with special attention paid to correct setting, panels, color sequence, and width of gates. Poles should conform to current specifications of the rules. As in Downhill and Super G, Giant Slalom gate panels need to meet current homologations for fastening and minimum distance above the snow. For single-gate Giant Slalom, first gate, last gate, and delay gates are the only gates that require both a turning and outside pole. All rules and regulations regarding the width of the racecourse should be considered as if there was an imaginary outside gate. *Please refer to current rules regarding “single-gate Giant Slalom.”*

Slalom racecourse setting should conform to current specifications. Gate panels are no longer used, and poles should conform to current specifications. For single-pole Slalom, first gate, last gate, delay gates and combination gates (hairpins, verticals) are the only gates that require both a turning and outside pole. *Please refer to current rules regarding “single-pole Slalom.”*

For Slalom, Giant Slalom, and Super G events with multiple age classes competing, e.g., U10, U12, U14, U16, course setting specifications must be based on the specifications for one class older than the youngest class competing; in this instance, specifications for U12 would prevail. The U8 age class – as well as younger age classes – although recognized by U.S. Ski & Snowboard, are established for the purpose of awards and U10 course setting specifications apply to these younger age classes.

For Downhill events with multiple age classes competing, course setting specifications must be based on the youngest class competing.

### **RACECOURSE PREPARATION SUGGESTIONS**

Advance racecourse preparation is a key element of a successful race, and no amount of race day effort will replace it. The Organizing Committee (OC) should consider the recommendations of the area management and the consideration of the skiing public. It is essential to keep area management informed, involved, and committed throughout the planning. Advance, joint planning is necessary if an organizer wishes to achieve cooperation and commitment from area management.

Racecourse preparation begins prior to the first snowfall by clearing obstacles from the slope and alongside the racecourse. Brush is trimmed so the racecourse may be used with a minimum of cover.

Snow preparation begins with the first snowfall. If the race is to be held on a slope normally used by recreational skiers, it is usually groomed on a regular basis by the area. Working closely with the

experienced area employee in charge of slope maintenance, a schedule may be designed which will provide for the best conditions on the day of competition. Schedules should not be hastily prepared or implemented; often it may be wise to “wait” until conditions/temperatures stabilize.

Snow density is the primary factor for insuring a good racing surface for all of the competitors. Density is a function of moisture and compaction of the snow. Experience of the Organizing Committee, resort management, and local groomers and snowmakers will help to insure a good track for the competitors.

Prior to the day of the event, the surface of the racecourse should be made as firm and smooth as possible. Under most conditions, it will take at least 12 hours for reworked snow to properly “set.” Mogul cutting, using grooming machines, should be done well in advance of the event.

There are many options available for mechanical preparation. Depending on the ski area “rolling stock,” the snow conditions and anticipated weather, the ski area employee in charge of grooming is generally the most knowledgeable. Qualified personnel should discuss preparation of the racecourse well in advance of the event. This will ensure that the grooming staff is aware of current course preparation requirements. The security of ski competitions demands recognition of the difference between snow preparation for competition and snow preparation for recreation.

*Track Packing* may be used early in the season to develop a base. This increases friction and tilling and provides a rough surface to which future snow may adhere. This may also help in consolidating deep, dry snowfalls until they may be worked more intensely. With care, track packing may provide enough consolidation and adhesion for new snow to adhere to a frozen base.

*Tiller Bar* is hydraulic powered to apply significant down pressure and is the standard grooming device for most ski areas with modern grooming equipment. It leaves a smooth or slightly rippled surface, but if worked in very deep snowfalls, it may leave layers of compacted snow. Continuous packing is necessary during heavy storms or a sufficient period of time must be allowed to elapse after grooming to allow top layers to “set.”

A *Cutter Bar or Blade* is used to “cut” moguls and move snow and should be followed up by finish grooming to leave a skiable surface. This type of grooming requires skilled operators.

Certain levels of events require racecourses be prepared with the use of a **Water Injection Bar or by spraying water on the track in conjunction with grooming.** These techniques add water to the racecourse and, when set, provide a firmer racing surface.

Machine preparation is quick and usually effective, but machines do have their limitations. Compacting power is diminished on very steep slopes (45 %+), and control of the machine may be difficult in some conditions. Also, some machines do not maneuver or pack well on a side-hill.

Under some circumstances, use of machinery may damage the prepared track, and unless there is sufficient time for the surface to be slipped by skis after working, machinery is best kept off Downhill racecourses until the depth of new snow may no longer be handled by working on skis.

In the event that machines are not available, or their use would be ineffective, manual means of snow preparation will be necessary. When snow cover is very thin, the slope is too steep for effective machine use, the crust layer will support skis but break under machines, the racecourse is covered with old unpacked snow, or there is a great depth of new snow, it may be necessary to *ski* or *boot pack* before machinery may be effective. Packing teams need to be knowledgeable, organized, thorough, and dedicated.

Ideally, *boot packing* should be done several days in advance to be as effective as possible. When boot packing, several passes over the slope are usually needed. Boot holes should be left open and not packed or slipped over until two days before the event or beginning of training. The racecourse should then be ski packed on the day before the event, and the ridges should not be slipped.

*Ski packing* is necessary when there is very thin snow cover, a racecourse needs smoothing after being boot packed, there are isolated areas that cannot be reached by machinery, or machinery is not available.

*Side slipping* is used for final smoothing of the racecourse and/or removing loose snow from the track.

### **SPECIAL SITUATIONS**

When new snow is expected overnight, it is best to defer racecourse setting until morning. If snow starts during the night, cat crews should be constantly packing new snow as it falls. Racecourse maintenance crews should be prepared to begin work on the racecourse as early as possible to move the fresh snow off to the sides of the racecourse if the new snow is not too deep or heavy. In this situation, additional help should be available for the Course Setter.

If the snow cover is thin, dry snow may be sprayed with water in order that loose snow, when applied, will adhere and will be more resistant to ski traffic. Ice patches may either be sprayed with water or industrial-type propane torches may be used to partially melt relatively large areas that will also allow loose snow to adhere.

Snow hardening agents may be used if adequate moisture exists in the snowpack and/or melt ice for new snow to adhere in a variety of situations including

- When snow is too cold and dry (powder or granular)
- When snow sticky - it is too soft or wet due to mild weather and/or rain
- When the snow is actually hard ice

Application of snow hardening agents to loose snow will create a more durable racing surface; application to an ice surface may also have the benefit of adding “texture” to the racing surface. Organizers should work with ski area management regarding types of snow hardening agents allowed by the area or local environmental agencies and regulations.

When using snow hardening agents, the upper layer of snow is ski packed and then smoothed with skis or rakes and shovels. The section to be prepared is “salted” by hand or with a spreader. The agent being used is scattered on the surface and then covered with a thin layer of snow by side slipping or shoveling. The treated area should extend beyond the track itself.

In order to give competitors a “feel” for the treated snow, it is recommended that practice areas, if provided, be treated in the same manner as the racecourse. Start and finish areas should also be prepared in the same manner as the racecourse. A treated racecourse may become smooth only after several skiers use it, and advance preparation for an adequate number of forerunners will assist in providing an even surface for all competitors.

Granular spring snow may be hardened by the use of additives. Preparation of the trail with snow hardening agents, if done in due time, is more effective than applying water because it allows the snow to become moist and even. With new snowfall, the snow needs to be treated and compressed during, or immediately after the snowfall to take advantage of the humidity in the new snow. When using snow hardening agents, prepare several test patches adjacent to the racecourse in order to evaluate the effectiveness of the snow hardening agents.

Snow hardening agents are generally not recommended for use with dry snow at low temperatures. When they are used, the snow becomes hard more quickly at varying depths and the hardness lasts for differing amounts of time.

When time is an issue, or if a Slalom trail needs overnight preparation with cold and loose snow, water and snow hardening agents may be used in combination. In this case, the trail should be boot packed, snow hardening agents should be spread evenly, and the trail should then be watered. Working the trail in small areas, this mixture of snow hardening agent and water should be immediately boot packed into the snow and then ski packed to make it smooth.

Although snow hardening agents may be used in varying amounts on certain sections of Giant Slalom, Super G, and Downhill racecourses, it is best to evenly prepare the entire Slalom racecourse.

When there is damp or wet snow that does not freeze because of mild temperatures, compact snow may be obtained through the use of snow hardening agents. Such products may also be effective because of rain and/or a rise in temperature.

Very wet, rippled snow is usually found in the spring when there is warm, rainy weather or when rainfall mixes with snow. The same substances used for wet snow are effective, but much deeper preparation is needed before snow hardening agents are spread and must be repeated after spreading. If the snow is very humid, it may be necessary to use a different snow hardening agent.

Snow hardening agents may be used to make frozen or icy trails softer or to soften a trail so it can be smoothed. A racecourse may need to be softened when rainfall is followed by a sudden freeze. Snow hardening agents should be spread on icy surfaces that have been raked slightly to scratch the surface so it can hold the snow hardening agents. Amounts, methods, and time needed depend on the temperatures. A test may be necessary to determine the time required for softening.

There are many snow hardening agents available for different types of racecourse maintenance. The type of snow, the reaction of the snow hardening agents, and the method of application should be considered when making a choice. As stated before, ski area personnel and/or environmental agencies/regulations need to be consulted; Environmental Agency regulations may limit type and/or amount of snow hardening agents used in a particular area.

***NOTE:** Traces of some snow hardening agents may be transferred from on-hill clothing/equipment to travel clothing/equipment and may cause airport security alerts.*

### **RACECOURSE MAINTENANCE SUGGESTIONS**

Racecourse maintenance begins with preparation of the slope to be used. It ends after the last competitor has crossed the finish line and all required equipment has been removed. Potential trouble areas should be anticipated, and proper planning should be undertaken to avoid problems. Constant racecourse maintenance work is necessary during the race to slip out ruts, holes, and “chatter marks” from the turning areas. The objective is to make the racecourse as equitable for the last competitor out of the start gate as it was for the first competitor. Maintenance of the start area and finish area is as important as the maintenance of the actual racecourse.

If pre-race preparation has been successful, maintaining the racecourse during the race will be easier. If the race is a Downhill, part of maintenance will be preparation for the next day's training or race.

As with other race operations, racecourse maintenance is easier, more enjoyable, and more effective if it is properly organized, and the workers are shown leadership and coordination. Communication is essential so that there is no delay in response or error in assigned tasks. The number of racecourse maintenance workers needed is dependent on start intervals, number of racecourse sections, location of lifts, lift ride time, snow conditions, etc.

The most effective racecourse maintenance work is done by several crews under the direction of an experienced leader and staffed by skiers with sufficient weight and skill for the job. Each crew may be assigned a section of the racecourse that they will work continuously, or they may rotate down the racecourse and move from one section to another. *When a rotation system is used, one crew should always be either already at the start or on the lift headed for the start.*

With sufficient organization, it should not be necessary to interrupt the race for maintenance other than at brief predetermined intervals. Should an interruption be needed, the delay must be approved by the Jury and announced to all officials, competitors, and coaches. Adequate communication will be needed to assure the racecourse is clear of all competitors so that maintenance work may start.

Competitor inspections may damage a Downhill racecourse more than training runs will and may necessitate repair before the training run may start. Also, the best-prepared Downhill racecourse will suffer during training. Weather permitting, maintenance work should be done as soon as possible so a developing problem is not aggravated. All major repair work should be completed after the last run of the day so the racecourse may “set” overnight.

Turns, landing areas after jumps, flats, and traverses are areas that require regular maintenance. Some sections only need side slipping, but others may require major work with shovels, torches, water, and snow hardening agents. *A good Chief of Course will anticipate problem areas and organize crews accordingly.*

Recent challenges due to extremes in weather/climate change have caused alterations to slope use, vertical drop, and the location of the start and the timing installations. The Chief of Course should be aware of alternate racecourses, and the range of the track within the Homologation.

The Chief of Course should:

- Anticipate future challenges may include consideration of higher start locations, higher finish/timing installations.
- Have additional timing/communication cables to allow greater range of timing/finish line locations.
- Consider alternate courses or even moving events to an alternate resort. (*Moving an event to an alternate resort will require a new Schedule Agreement.*)
- Consider off-season construction of mobile timing buildings if not already available.
- Coordinate with the Organizing Committee in order to successfully complete events/schedule by being prepared and knowing your alternatives.

***Regardless of the event being contested, there is no substitute for thorough planning and organization when preparing and maintaining a trail for competition.***