Press release on "Icy slopes and ski piste preparation"

Men's and women's Alpine skiing
for Slalom, Giant slalom, Super-G and Downhill disciplines.

Pistes for every discipline are compacted exactly to the respective hardness required while remaining unfrozen with the aid of **injection bars**.

In order to reach a better understanding of ice or icy slopes, below is chart of various volumetric weights of water in all aggregate states:

Specific weight of snow per m³:

Natural snow	70 - 200 kg/m³
Artificial snow	350 - 400 kg/m³
Ice	900 kg/m³
Water	1000 kg/m³

The following piste standards are sought through the use of injection bars:

Discipline	Women's	Men's
Slalom	580 kg/m³	640 kg/m³
Giant slalom	550 kg/m³	580 kg/m³
Super-G	480 kg/m³	550 kg/m³
Downhill	450 kg/m³	510 kg/m³

Even this short overview indicates that no ice is produced when using injection bars.

Unfortunately the expression "icy slopes" is never absent from ski-reports. Yet there are isolated mentions of ice being sprayed onto pistes by injection bars. Therefore, here are a couple of suggestions for possible alternatives:

- Firm piste, extremely firm piste, hard piste, very hard piste
- Stable ground, no grooves in the snow evident even after many skiers
- High snow density e.g. 600 kg/m³
- Hard snowpack, but grippy, e.g. below 450 kg/m³
- Hard snowpack, high volumetric weight
- Compacted ground with low volumetric weight
- Elastic surface without ribs, e.g. 480 kg/m³
- Dry, hard snowpack, -14 °C

Water is sprayed through special nozzles in the snow with the injection bars. Heat escapes from the thousands of holes into the groomed snowpack and the evaporative heat loss promotes the desired hardness of the piste without producing any ice. By using the injection bars, pistes may be groomed in the same manner even when ambient temperatures are above zero. The surface then remains largely free of water. By using this technique, chemical snow hardeners may very often be dispensed with.

There has never been a race cancelled due to the piste being too hard, but races have often been cancelled owing to a piste being too soft or having disintegrated.

Safety

Disintegration of the piste is largely eliminated through use of the injection bar. This increases the safety of ski racers by a multiple.

The hardness of the piste increases the safety of the race significantly and skiers with high gate positions have as good a chance as those starting early, since the piste condition is approximately the same as it had been for the first skier.

A selection of the last ski pistes groomed by Christian Steinbach:

Alta Badia	Training piste	Bambi 2, giant slalom and slalom 570 kg/m³
Alta Badia	Men' giant slalom 440 kg/m³	Men's slalom 460 kg/m³
Zagreb	Women's slalom 640 kg/m³	Men's slalom 630 kg/m³
La Molina	Women's slalom 550 kg/m³	Giant slalom 530 kg/m³
Sölden	Men's giant slalom 580 kg/m³	Women's giant slalom 555 kg/m³
Semmering	Women's slalom 540 kg/m³	Women's giant slalom 540 kg/m³

The above examples clearly indicate that the quality of pistes produced is far from icy. The piste is compacted by the injection bars, i.e. the density of the snow is brought to the appropriate weight by the water injected. The specific volumetric weight is increased by approx. 150 kg, on the basis established by snow machines. In order to ensure race safety, it is extremely important to discriminate between slalom, giant slalom and speed standards. A further difference lies between women's and men's standards.

The effectiveness of Christian Steinbach's injection bars have been corroborated and confirmed in several studies conducted in collaboration with the SLF, Swiss Federal Institute for Snow and glaciology. (www.slf.ch)

More information may be found on Christian Steinbach's website: www.steinbach-alpin.com