



Avalanche Warning Service
Eduard-Wallnoefer-Platz 3
A-6020 Innsbruck



User Manual

These user instructions were drawn up by the Tirol Avalanche Warning Service. Please send all enquiries and comments to: lawine@tirol.gv.at.

FAQ

- *After typing in the coordinates and pressing the Enter key (Return) the SnoProfiler crashes and all data are lost. Why?*

We are currently experiencing some similar issues when using Internet Explorer v9. We recommend updating your web browser or switching to another browser (e.g., Firefox, Chrome, Opera).

- *The temperature entered is not accepted. Why?*

Only temperature values with decimal points are currently accepted. A temperature containing a comma will not be saved. The same applies to coordinates and all other numerical fields.

- *I made an entry error and noticed it only after it was saved. Can I subsequently alter my entered profile?*

No. Profiles can only be altered or deleted by the administrators. In urgent cases, please contact lawine@tirol.gv.at via E-mail.

- *My entry for snow hardness is not accepted. What am I doing wrong?*

In order to avoid incorrect entries, rules have been built into the snow hardness category. Layers with only round-grain snow crystals do not permit entry of Hardness 1 and Hardness 1-2; and for layers with only new fallen snow and/or decomposed snow, only Hardness 1, 1-2, and 2 can be entered.

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SnoProfiler

The EAWS SnoProfiler is a newly developed online tool for drawing snow profiles. Each profile is publicly available and can be uploaded through an intuitive, easy-to-grasp user interface. You can access the SnoProfiler via <http://www.avalanches.org> (see Fig. below) or directly via the [LAWIS](#) platform.



General Information

The SnoProfiler is among the information services *Weather stations* and *Avalanche incidents* part of the LAWIS (Lawinen-Informationssystem) project. They all share a common layout and thus are similar to handle. There are four main fields of information in LAWIS: filter bar – map window – snow profile list – drawing window. Below you will find a few lines on each of these layers.

If you want to enter your own snow profile you can do so by clicking **Profiles +** in the Tab bar. We will explain this in detail in section 5 ([Enter a new profile](#)).

1 Filtering information:

The screenshot displays the SnoProfiler interface with the following elements:

- Filter Bar:** Includes filters for '1 month', 'all regions', 'all aspects', and 'all altitude ranges'.
- Map:** Shows a map of Europe with a red dot indicating the location of the selected profile at Marchkopf.
- Profile List:** A table listing snow profiles with columns for date, region, altitude, aspect, and snow depth. The profile for Marchkopf is highlighted in red.
- Profile Details:** A detailed view of the 'Marchkopf' profile, including its name, location, altitude, aspect, and snow characteristics.

Date	Region	Altitude (m)	Aspect	Snow Depth (cm)
2015-11-24 15:30	Aragón	2115	SW	22
2015-11-24 15:30	Aragón	2115	N	22
2015-11-24 11:30	Tirol	1450	E	33
2015-11-23 14:15	Tirol	2360	NE	30
2015-11-16 13:00	Caucasus	2127	N	28
2015-11-16 12:20	Tirol	2940	NE	33
2015-11-16 12:00	Tirol	2920	N	15
2015-11-16 11:00	Caucasus	2292	E	35
2015-11-14 10:00	Tirol	3150	NE	27
2015-11-13 07:20	Tirol	2460	NW	30
2015-11-13 06:55	Tirol	2580	NW	20
2015-11-04 11:35	Tirol	3059	N	26
2015-11-04 11:05	Tirol	3064	SE	32

Schneeprofil: Marchkopf

Name: Wierer Stefan | E-Mail: info@zillertal-bergfuehrer.at | Datum: 23. Nov. 2015 14:15

Ort: Marchkopf | Seehöhe: 2360 m | Lufttemperatur: -14.0°C
 Subregion: Tuxer Alpen | Hangneigung: 30° | Niederschlag: kein Niederschlag
 Region: Tirol | Exposition: NO | Intensität:
 Land: Österreich | Windgeschw.: kein Wind (0 km/h) | Bewölkung: leicht bewölkt (1/8 - 2/8)
 Lat. / Long.: 47.2554° / 11.8083° | Windrichtung:
 Schneeprofilklasse:

Legende: Neuschnee, Rundkornig, Tiefereif, Schmelzform, kornig, abgerundet, Schmelzkriste, Flöcher Schnee, Kantenkornig, Eislamelle, Graupel

Bemerkungen:
 trockener, lockerer Neuschnee im fliegendem Stadium ohne wesentlichen Windeneinfluss liegt mit guter Verbindung auf einem erkennbaren aber schwach ausgeprägten Marschdeckel; in den bodennaheren Schichten ist der Wärmeinfluss durch Regen durch die stark verkümmerten kantigen Formen gut erkennbar.
 auffällig: der starke Temperaturgradient.
 Auslösetemperatur 5cm oberhalb der Schneedecke: -17.0°C
 Auslösetest:
 EET 31

Above the map window you will find a section where you can filter existing snow profiles by period, region, aspect, and altitude ranges. Each selection will be applied on-the-fly without the necessity of confirming your choice. As a result, only your filtered selection of profiles is shown in both the map window and the list below.

2 The map window:

The screenshot shows a web application interface for snow profiles. The interface is divided into several sections:

- Navigation and Filters:** At the top, there are tabs for 'Stations', 'Profiles +', and 'Incidents'. Below these are filters for '1 month', 'all regions', 'all aspects', and 'all altitude ranges'.
- Map Window:** A map of the Alpine region is shown, with a red dot indicating the location of the selected snow profile. The map includes labels for cities like Freiburg, München, Rosenheim, Innsbruck, and Bolzano/Bozen.
- Table of Profiles:** A table lists 13 snow profiles. The selected profile is highlighted in red. The table columns are: Date, Time, Region, Altitude (m), Aspect, and Snow Depth (cm).
- Snow Profile Detail:** The right window shows a detailed view of the selected profile, 'Marchkopf'. It includes a vertical cross-section of the snow profile, showing different snow layers and their characteristics. The profile is titled 'Schneeprofil: Marchkopf' and includes metadata such as name, location, and date.

Date	Time	Region	Altitude (m)	Aspect	Snow Depth (cm)
2015-11-24	15:30	Aragón	2115	SW	22
2015-11-24	15:30	Aragón	2115	N	22
2015-11-24	11:30	Tirol	1450	E	33
2015-11-23	14:15	Tirol	2360	NE	30
2015-11-16	13:00	Caucasus	2127	N	28
2015-11-16	12:20	Tirol	2940	NE	33
2015-11-16	12:00	Tirol	2920	N	15
2015-11-16	11:00	Caucasus	2292	E	35
2015-11-14	10:00	Tirol	3150	NE	27
2015-11-13	07:20	Tirol	2460	NW	30
2015-11-13	06:55	Tirol	2580	NW	20
2015-11-04	11:35	Tirol	3059	N	26
2015-11-04	11:05	Tirol	3064	SE	32

13 selected (14 total)

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The map window serves as an overview of locations where recent snow profiles are available. Within this interactive map window you can shift and zoom the map scale using your mouse. You can also select any snow profile by mouse-click, resulting in the profile being marked in red and drawn in the right window (see figure above).

3 Existing snow profiles:

The screenshot displays the 'Stations Profiles Incidents' software interface. The main window shows a map of Central Europe with a red dot indicating a snow profile location near Innsbruck. Below the map is a list of 13 snow profiles, with the one from 2015-11-23 highlighted in red. To the right, a detailed 'Schneeprofil: Marchkopf' view shows a vertical cross-section of the snow profile with various layers and a temperature profile line.

Time	Country	Region	Altitude (m)	Aspect	Incline
2015-11-24 15:30	Spain	Aragón	2115	SW	22
2015-11-24 15:30	Spain	Aragón	2115	N	22
2015-11-24 11:30	Spain	Tirol	1450	E	33
2015-11-23 14:15	Austria	Tirol	2360	NE	30
2015-11-16 13:00	Georgia	Caucasus	2127	N	28
2015-11-16 12:20	Austria	Tirol	2940	NE	33
2015-11-16 12:00	Austria	Tirol	2920	N	15
2015-11-16 11:00	Georgia	Caucasus	2292	E	35
2015-11-14 10:00	Austria	Tirol	3150	NE	27
2015-11-13 07:20	Austria	Tirol	2460	NW	30
2015-11-13 06:55	Austria	Tirol	2580	NW	20
2015-11-04 11:35	Austria	Tirol	3059	N	26
2015-11-04 11:05	Austria	Tirol	3064	SE	32

13 selected (14 total)

Schneeprofil: Marchkopf
 Name: Wierer Stefan | E-Mail: info@alpen-bergfuehrer.at | Datum: 23. Nov. 2015 14:15
 Ort: Marchkopf | Seehöhe: 2360 m | Lufttemperatur: -14.0°C
 Subregion: Tuxer Alpen | Hangneigung: 30° | Niederschlag: kein Niederschlag
 Region: Tirol | Exposition: NO | Intensität: leicht bewölkt (1/8 - 2/8)
 Land: Österreich | Windgeschw: kein Wind (0 km/h) | Bewölkung: leicht bewölkt (1/8 - 2/8)
 Lat. / Long.: 47.2554° / 11.8083° | Windrichtung: | Schneeprofilklasse:

Bemerkungen:
 trockener lockerer Neuschnee im flügeligen Stadium ohne wesentlichen Windinfluss liegt mit guter Verbindung auf einem erkennbaren aber schwach ausgeprägten Marschdeckel; in den bodennahen Schichten ist der Wärmeinfluss durch Regen durch die stark verkümmerten kantigen Formen gut erkennbar.
 zusätzlich der starke Temperaturgradient:
 Aussettemperatur 5cm oberhalb der Schneedecke: -17.0°C
 Auslösetest:
 ECT 31

This is a list of all recently dug snow profiles. By clicking on the icons above the list you can sort this list by time of creation, country, region, altitude, aspect, and incline. Navigating the mouse over the symbols should result in a short pop-up description of each symbol.

When selecting a particular profile from the list it will be marked red in the map window and also drawn in the Profile viewer. You can navigate through the profiles in the list by using either your mouse or the up/down keys on your keyboard.

PLEASE NOTE: snow profiles are currently available only in the language the user has chosen beforehand. However, the drawing layout remains the same for all languages, so an experienced user will be able to read profiles in both English and German. We are currently working on that issue!

4 Profile Viewer:

The Profile Viewer interface displays a map of Central Europe with a red dot indicating the location of Marchkopf in the Tirol region. Below the map is a table of snow profiles. The right side of the interface displays a detailed snow profile for Marchkopf, including a graph of snow depth over time and a table of snowpack layers.

Time	Country	Altitude (m)	Aspect	Wind Speed (km/h)
2015-11-24 15:30	Aragón	2115	SW	22
2015-11-24 15:30	Aragón	2115	N	22
2015-11-24 11:30	Tirol	1450	E	33
2015-11-23 14:15	Tirol	2360	NE	30
2015-11-16 13:00	Caucasus	2127	N	28
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2015-11-13 07:20	Tirol	2460	NW	30
2015-11-13 06:55	Tirol	2580	NW	20
2015-11-04 11:35	Tirol	3059	N	26
2015-11-04 11:05	Tirol	3064	SE	32

Schneeprofil: Marchkopf

Name: Werner Stefan | E-Mail: info@lwd-tirol-bergfuehrer.at | Datum: 23. Nov. 2015 14:15

Ort: Marchkopf | Seehöhe: 2360 m | Lufttemperatur: -14.0°C
 Subregion: Tuxer Alpen | Hangneigung: 30° | Niederschlag: kein Niederschlag
 Region: Tirol | Exposition: NO | Intensität: | Bewölkung: leicht bewölkt (1/8 - 2/8)
 Land: Österreich | Windgeschw: kein Wind (0 km/h) | Schneeprofilklasse:
 Lat. / Long.: 47.2554° / 11.8083° | Windrichtung:

Legend: Neuschnee, Fälliger Schnee, Rundkornig, Karstige Kornig, Tafelreif, Oberflächenreif, Schmelzform, Eislamelle, kantig, abgerundet, Graupel, Schmelzkriste

Bemerkungen:
 trockener lockerer Neuschnee im flügeligen Stadium ohne wesentlichen Wiedereinfluss liegt mit guter Verbindung auf einem erkennbaren aber schwach ausgeprägten Marschdeckel; in den bodennaheren Schichten ist der Wärmeeinfluss durch Regen durch die stark verkümmerten kantigen Formen gut erkennbar.
 außerdem der starke Temperaturgradient.
 Auslösetemperatur 5cm oberhalb der Schneedecke: -17.0 °C
 Auslösetest:
 ECT 31

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The Profile viewer shows a detailed structure of each snow profile including general information in the upper part of the box and the different snowpack layers below. You can enlarge the drawing by clicking inside the box; then save the image by right mouse click – Save As...

5 Entering a new snow profile:

The entry form for a new snow profile is called up through the plus right of **Profiles** . The entry form is subdivided into four parts.

Enter General Information

Optional information from Remarks depicted in graphs

Depending on register card: entry space for **Snow profile layers, Layer temperatures** or **Stability test results**

Graphic depiction of snow profile

5.1 General information

Mandatory fields (as of 27 Jan 2015)	Optional fields (as of 27 Jan 2015)
Name	E-Mail
Profile date	Air temperature
Time	Comments
Location	
Country	
Region	
Subregion	
Lat. /Long. (Coordinates)	
Elevation	
Sky condition	
Precipitation	
Incline	
Aspect	
Wind speed	
Wind direction	

Please note that the input window for *Wind direction* is only available after filling the field *Wind speed*.

5.2 Coordinates (Lat. / Long.)

Coordinates can be entered in two different ways:

1. As soon as one of the spaces for entering geographical coordinates is clicked, a digital map appears; by means of the left mouse button the spot of the snow profile can be entered directly. That spot is then marked by a small red circle. You can navigate on the map in the customary way by using the mouse (left mouse click + dragging: map segment is moved; scrolling mouse wheel or clicking + / - symbols at the upper left of the map: zoom map)
2. Directly entering geographical coordinates (geographical latitude and longitude) in case data are ascertained with GPS

Name	Max Mustermann	Country	Österreich	Notes
e-Mail	m.mustermann@email.at	Region	Tirol	
Profiledate	2013-12-01	Subregion	Westliche Nordalpen	
Time	10:30	Lat. / Long.	47.19940 11.33708	Close

Click onto the map to set latitude and longitude Reset position

5.3 New Profile

Enter Profile

To enter a new snow profile, select the tab **Profile**. Note that you have to insert each snow layer from **top to bottom**.

Profile		Snow Temperature		Stability Tests			
H_{max} [cm]	H_{min} [cm]	θ	F^1	F^2	D_{min} [mm]	D_{max} [mm]	K [N]
100.0	92.5	1			1.00	1.00	4

For each snow layer of the analysed snowpack, information on the depth of the layer boundaries (H_{max} , H_{min}), the moistness of the snow (θ), the kernel form (F^1 , F^2), the kernel size (D_{min} , D_{max}) and the hardness of the snow ($K_{[N]}$) is required. Once all the required data pertaining to a snow layer have been entered, it is submitted by pressing the symbol. In order to make sure each of the snowpack layers is saved and uploaded it is recommended to

press  after each layer. The note “*Visualisation not up-to-date*” will tell you when layers have not been drawn yet.

ATTENTION! By pressing the green check box in the navigation bar above the form you will upload the current snow profile. Therefore, make sure to have each snowpack layer included in your profile. Once a profile is uploaded, only the web admin (lawine@tirol.orf.at) can modify or erase this profile.

By pressing any of the symbols    the entries about the layer you can **edit** , **delete**  or add a **new layer** . If another new layer is added, a new entry block appears. Please note that a new layer can only be submitted if H_{\min} of the previous layer is > 0 [cm] so make sure that you insert the layers from **top to bottom**.

Value	Range	Description
H_{\max} [cm] and H_{\min} [cm]	0 to 1000	H_{\max} → perpendicular distance between the upper limit of the layer and the ground in cm H_{\min} → perpendicular distance between the lower limit of the layer and the ground in cm
θ	1 - 2 - 3 - 4 - 5	1 → dry snow below 0°C 2 → weak moist, sticky snow at 0°C 3 → moist water visible ; no drainage 4 → wet saturated; water drains off 5 → very wet soaked with water
F^1 und F^2	<ul style="list-style-type: none"> + Precip. particles ✓ Decomposing and fragmented precipitation particles ● Rounded grains ▣ Faceted crystals ^ Depth hoar ∨ Surface hoar ○ Melt forms ■ Ice formations ▢ Faceted, rounded ⊕ Graupel ⊙ Melt-freeze crust 	kernel forms: F^1 – prevalent kernel form F^2 – subordinate kernel form <i>Note 1:</i> if only one kernel form is evident → $F^1 = F^2$ <i>Note 2:</i> If a melt-freeze crust is entered, F^1 is always for the melt form. With F^2 an additional kernel form can be entered.
D_{\min} [mm] and D_{\max} [mm]	0,25 - 0,5 - 1,0 - 1,5 - 2,0 2,5 etc.	kernel size: D_{\min} → size of the smallest kernels D_{\max} → size of the largest kernels typical sizes: new fallen snow: 1-3 mm felt-like snow: 1-2 mm round kernels: 0,25-0,5 mm angular kernels: 1-3 mm depth hoar: 2-5 mm surface hoar: 2-5+ mm melt form: 1-5 mm faceted, rounded: 0,5-3 mm graupel: 0,5-3 mm
$K_{[N]}$	1 to 6	snow hardness 1 → fist [FA] very soft 2 → 4-fingers [4F] soft 3 → 1-finger [1F] medium hard 4 → pencil [B] hard

5 → **knife** [M] very hard
6 → **ice** [-] hard compacted

PLEASE NOTE: for each snow layer boundary the SnoProfiler will compute '**Lemons**' as a measure of snowpack stability: the lemon-shaped symbols are drawn into a separate column next to **snow hardness** and follow a simple pattern: the more lemons, the more unstable the snowpack; typically, 4 or 5 lemons correspond to a weak structure.

Enter Snow Temperature

To enter snow temperature data switch to the **Snow Temperature** tab:

The screenshot shows the 'Snow Temperature' tab in the SnoProfiler software. A pink arrow points to the 'Snow Temperature' tab. Below the tab, there is a table with two columns: 'H[cm]' and 'T[°C]'. Each column has a text input field and a vertical spinner. To the right of the 'T[°C]' column is a checkbox with a checkmark. Below the table, there is a small icon of a plus sign in a square.

For a snow temperature entry, the depth of the measurement spot ($H_{[cm]}$) and the temperature values ($T_{[°C]}$) are required. Just like with the snow layer entries, the entry is confirmed with the symbol, which can be changed at any time or deleted . A new snow temperature can be added by clicking the symbol.

PLEASE NOTE: Temperatures of the snowpack surface are ordinarily measured at points 10 cm apart.

Enter Stability Tests

The SnoProfiler currently supports three main types of **Stability Tests**: Slide block test ('Rutschblock test'), Compression Test (CT), and Extended Compression Test (ECT). A short introduction to the ECT including a How-to-video, for instance, is provided by the US National Avalanche Center: <http://www.fsavalanche.org/stability-tests/>.

Compression Test (CT)

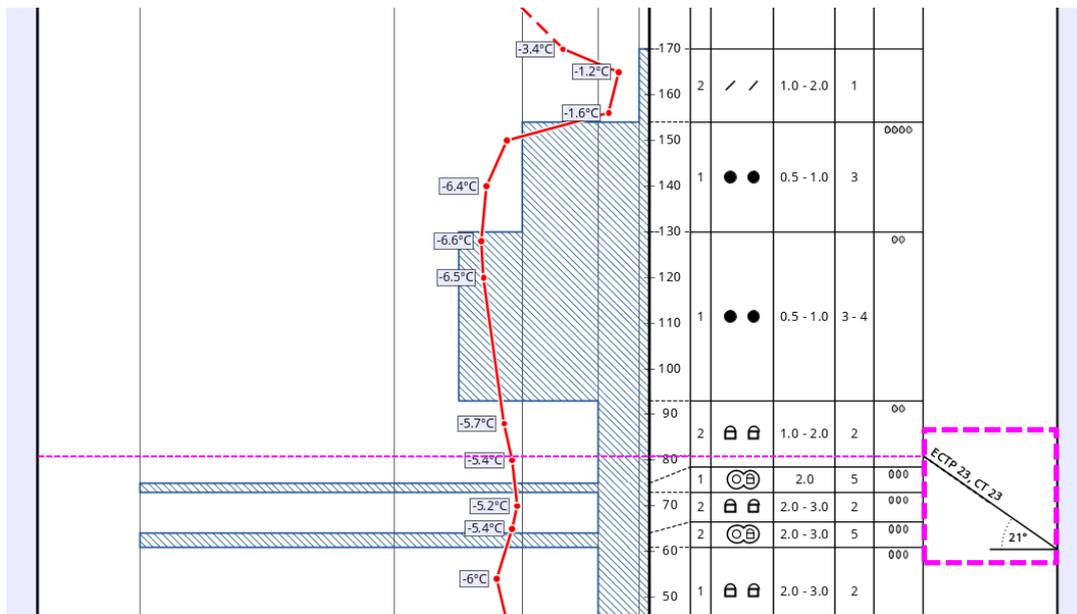
The CT primarily provides information about the existence of weak layer within the snowpack. You can run a CT rather quickly but it is less informative than the slide block test or the ECT, mainly because CTs provide no information about the propagation of a fracture in a weak layer.

To perform a CT a 30cm by 30cm snow column is isolated from the surrounding snowpack by using a shovel, snow saw, and/or a piece of knotted cord down to the weak layer of interest. The slope of your test location should be around 35° (but no less than 30°). Remember: **your safety comes first**, so always choose a representative but safe site location. After isolating the column, place your shovel on one end of the column and apply a series of compressive forces to the top of the shovel blade: 10 taps from your wrist, then 10 taps from your elbow, then 10 taps from your shoulder. The results of the CT should be recorded in the following manner:

- CT0@...** a fracture across the column occurs during isolation (very unstable result).
CT1-10@... a fracture occurs during the first 10 taps (from your wrist)
CT11-20@... a fracture occurs during the next 10 taps (from your elbow)
CT21-30@... a fracture occurs during the next 10 taps (from your shoulder)
CT31... no fractures occur after a total of 30 taps (generally a stable result)

The number after the CT (=Class) stands for the degree of instability (=Step); the value after the @symbol gives the height of the unstable layer within the snowpack (=H_[cm]) if a fracture occurs. Additionally, you should describe the characteristics of the fracture (=Result): partial break/whole block is gliding; the surface texture of the gliding block (regular/irregular fracture, rough/smooth surface); and the type of gliding movement (collapse/shearing/immediately/with resistance). The test will be submitted by clicking the symbol.

Example: CT23@81 describes the collapsing of a weak layer 81cm above the ground after the 23rd tap (3rd tap from shoulder). Both the depth of the fracture and the high number of taps executed would in this case indicate a generally stable snowpack.



The Extended Compression Test (ECT) shows the same result for the initiation of the fracture (#23). ECTP (P for propagating) reflects the propagation of the initial crack and thus indicates the potential of a slab avalanche when disturbing this weak layer. For details, see below.

Extended Compression Test (ECT)

The Extended Compression Test is being performed in a similar fashion to the Compression Test: the way how to apply a series of compressive forces to the snow surface remains the same as for the CT. However, the ECT holds information about both the initiation AND propagation of a fracture within a weak snowpack layer. The isolated column for the ECT is therefore bigger, measuring 90 cm across the slope and 30 cm up the slope. These dimensions make it possible to create “mini-avalanches” on a very small model of the slope under investigation. Please note that you have to pay close attention to whether or not the initial fracture is propagating across the weak layer. The results of the ECT should be recorded as follows:

- ECT0@...** a fracture occurs across the entire column during isolation (very unstable!)
- ECTP#@...** a fracture occurs across the entire column (propagation) after # taps; to count as ECTP the propagation of the fracture has to occur by no later than the next tap after initiation
- ECTN#@...** a fracture initiates but does not occur across the entire column (no propagation) after # taps; if the fracture propagates later than the next tap after initiation it will still count as ECTN.
- ECT31...** no fractures occur after a total of 30 taps (generally a stable result)

Additionally, when observing ECTP or ECTN you should also be able to describe the gliding surface of the block: (1) partial break/ whole block is gliding; (2) rough/smooth surface of gliding layer. The test will be submitted by clicking the symbol.

Class	Step	H [cm]	Result
ECTN			<input checked="" type="checkbox"/> partial break (irregular) whole block (regular) / rough whole block (regular) / smooth

Example: ECTN14@80 describes a weak layer 80 cm above ground where a crack had been initiated after the 14th tap; however, the fracture did not propagate across the entire column even after the next tap (#15).

How to ... perform an Extended Compression Test (ECT)



Slide block test ('Rutschblock test' **RB**)

The 'Rutschblock test' is the most informative but also most time-consuming method to test the stability of a given snowpack. It tests an isolated block that measures 2 m across the slope and 1,5 m uphill, and should be performed in "representative" terrain (typically steeper than 30°). Again, look out for possible danger zones across the slope and try to avoid these spots: your safety always comes first! To test the stability of the isolated block you apply a series of compressive forces to the slide block surface as follows:

- RB 1@...** fracture occurs during isolation (spontaneous release)
- RB 2@...** fracture occurs while gently leaning on the slide block with one ski
- RB 3@...** fracture occurs while firmly bobbing with your skis on the slide block three times
- RB 4@...** fracture occurs after jumping onto the upper third of the slide block with your skis
- RB 5@...** fracture occurs after the 2nd or 3rd jump onto the slide block
- RB 6@...** fracture occurs after jumping onto the upper third of the slide block **without** your skis
- RB 7** no fracture occurs (slide block stays stable)

For the SnoProfiler you should also be able to describe the gliding surface of the slide block: (1) partial break: only one edge of the weak layer is gliding/ only the area underneath your skis collapses; (2) whole block is gliding: rough/smooth surface of the collapsing block (=weak layer). The test will be submitted by clicking the symbol.

Class	Step	H [cm]	Result
RB			<input checked="" type="checkbox"/> partial break (irregular) / only one edge partial break (irregular) / underneath the ski whole block (regular) / rough whole block (regular) / smooth

How to ... perform a slide block or 'Rutschblock' test

