



Research supports the observation of Fracture Character in stability tests (van Herwijnen 2005, van Herwijnen & Jamieson 2004, Johnson & Birkeland, 2002) as helpful in improving the interpretation of these tests. Experience suggests that fracture character may also be observed in shovel shear tests (OGRS 2002), shovel tilt/burp tests, deep tap tests (Campbell, 2004) and other tests which load a small column of snow until fracture appears.

Three major classes of fractures are identified: Sudden fractures, Resistant fractures and Breaks. The major classes are used to qualify and communicate test results that are significant for avalanche forecasting when test conditions will not allow direct observation of the fracture character subclasses.

When practical, experienced observers should observe the fracture using the recommended procedure and describe the results using the Fracture Character description outlined in the table below.

Procedure for observing Fracture Character in small column snowpack tests*:

The front face and side walls of the test column should be as smooth as possible. The observer should be positioned in such a way that one side wall and the entire front face of the test column can be observed. Attention should be focused on weak layers or interfaces identified in a profile or previous snowpack tests as likely to fracture. For tests on low-angled terrain that produced planar fractures, it may be useful to slide the two fracture surfaces across one another by carefully grasping the two sides of the block and pulling while noting the resistance.

Observations: Use the following table to characterize the fracture:

Fracture Character Major Class	Code	Description Sub Class	Code	Fracture Characteristics
SUDDEN <i>(Pops and Drops)</i>	SDN	Sudden Planar <i>(pop, clean & fast fracture)</i>	SP	A thin planar** fracture suddenly crosses column in one loading step AND the block slides easily*** on the weak layer
		Sudden Collapse <i>(drop)</i>	SC	Fracture crosses the column with a single loading step and is associated with a noticeable collapse of the weak layer
RESISTANT <i>(Others)</i>	RES	Progressive Compression <i>(step by step "squashing" of a layer)</i>	PC	A fracture of noticeable thickness (non planar fractures often greater than 1 cm), which usually crosses the column with a single loading step, followed by step-by-step compression of the layer with subsequent loading steps.
		Resistant Planar	RP	Planar or mostly planar fracture that requires more than one loading step to cross column and/or the block does NOT slide easily*** on the weak layer
BREAK**** <i>(Others)</i>	BRK	Non-planar break	NB	Non – planar, irregular fracture

Notes:

*"Small Column Snowpack Tests" refer to snowpack tests performed on an isolated column of snow where the objective is to load the column until a fracture (or no fracture) occurs. Typical small columns are less than 50 cm x 50 cm in cross section.

** "Planar" based on straight fracture lines on front and side walls of column

*** Block slides off column on steep slopes. On low angle slopes, hold the sides of the block and note resistance to sliding.

****For tests which result in no fracture of the column, record as No Fracture (NF)

Recording: Record the results of a test as follows:

<type of test> <test score> <(Fracture Character)> @ <Depth in Profile>, <Layer Characteristics (form, size, date of burial if known)>

i.e.: CTM 17 (SC) @ 34 on SH, 8mm, Jan 22

Fracture Depth: Whenever the test is performed in conjunction with a snow profile, the location of the fracture should be recorded according to the location of the weak layer in the profile.

Examples:

If multiple tests at the same site produce results on the same layer, record the results as follows:

<type of test> <test score #1> <(Fracture Character #1)>, <test score #2> <(Fracture Character #2)>, <test score #3> <(Fracture Character #3)>, etc, @ <Depth in Profile>, < Layer Characteristics (form, size, date of burial if known)>

i.e.: CTM 14(SP),17(SP),19(RP) @ 45 on SH (rounding) , 6 mm, Feb 12

Example #1

Compression Test: 36-degree slope, Weak Layer (SH 3 mm) at 45 cm below the surface.

Results:

Column fails @ 45 cm on the second tap from the elbow (CTM12). When the column fails, the fracture crosses the column suddenly (“pops”), and the block slides off the column.

Recording:

CTM12 (SP) @45 on SH size 3mm

Example #2:

Shovel Test: 25-degree slope, Weak Layer (SH 11 mm) at 65 cm below the surface. Date of burial known to be Jan 12.

Results:

Column fails @ 65 cm below the surface with moderate pull applied. When the column fails, the fracture crosses the column suddenly and the block slides easily at the fracture surface.

Recording:

STM (SDN) @65 on SH size 11mm, Jan 12.

Example #3:

Two Compression Tests in the same profile: 20 degree slope, 20 cm wind affected storm snow overlying PP and DF.

Results:

First Test: Column fails @ 22 cm’s on the third tap from the wrist (CTE3). When the column fails, there is squashing of at least part of the thickness of a soft snow layer but there is no horizontal displacement of the block. Additional loading steps continue to squash the soft snow layer.

Second Test: Column fails @ 22 cm’s on the seventh tap from the wrist (CTE7). When the column fails, there is squashing of at least part of a soft snow layer but there is no displacement of the block. Additional loading steps continue to squash the soft snow layer.

Recording:

CTE 3 (PC), 7(PC), @ 22 on PP size 4 mm

Example #4:

Shovel Tilt /Burp Test: Testing near surface layers, a 30 cm x 30 cm column of snow is isolated on the shovel blade and the bottom of the blade is tapped until a fracture appears in the column.

Results:

A fracture crosses the whole column 18 cm’s below the surface after tapping with moderate force on the blade of the shovel. The weak layer appears to be small DF’s and the block above the weak layer does not slide easily on the fracture surface.

Recording:

Shovel Tilt Test M (RP) @ 18 on DF 2mm.