



Standard Practice for Sampling and Inspection of Complete and Incomplete Alpine Ski/Binding/Boot Systems in Rental Applications¹

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INTRODUCTION

The intent of this practice is to provide guidelines for performing functional inspections and adjustments of Alpine ski/binding/boot systems. Adhering to these guidelines may help to reduce the risk of injuries resulting from improper mechanical functioning of releasable binding systems. However, skiing involves inherent and other risks. Injury can result from simply falling down, impact with an object, or from many other actions. Many injuries are unrelated to system function. Furthermore, even a properly functioning system cannot protect the skier in all situations. Therefore, it is to be clearly understood that compliance with these guidelines in no way guarantees that injury can be prevented.

1. Scope

1.1 This practice establishes a uniform method for the sampling and inspection of complete and incomplete Alpine ski/binding/boot systems used in rental operations. This practice is appropriate for use in rental applications in which all or part of the functional components of the system are supplied by the rental facility.

1.2 This practice should be followed by any facility that rents complete or incomplete Alpine ski/binding/boot systems to an end user.

NOTE 1—Refer to Practice F 1063 for equivalent procedures and tolerances for retail systems.

2. Referenced Documents

2.1 ASTM Standards:

F 939 Practice for Selection of Release Torque Values for Alpine Ski Bindings²

F 1063 Practice for Functional Inspections and Adjustments of Alpine Ski/Boot/Binding Systems²

3. Terminology

3.1 Definitions:

3.1.1 *Class I deviation*—a minor deviation that does not require corrective action, defined as ± 16 to 30 %, or 2 horizontal columns up or down from the selected reference torque value. Class I deviations are used to determine the

frequency of sampling.

3.1.2 *Class II deviation*—a minor deviation that prompts inspection of the entire inventory and corrective action, defined as ± 31 to 45 %, or 3 horizontal columns up or down from the selected reference torque value.

3.1.3 *Class III deviation*—a major deviation that prompts corrective action and a review of all procedures, defined as more than ± 45 %, or more than three horizontal columns up or down from the selected reference torque value. The in-season sampling and inspection program is designed to render the occurrence of a Class III deviation unlikely.

3.1.4 *clean versus lubricated tolerance*—the accepted difference between clean and lubricated test result(s), defined as not more than 20 % of the clean test, used whenever a functional test for binding-boot compatibility is required.

3.1.5 *correction factor*—the value that must be added or subtracted from the initial visual indicator setting to bring the test result within the inspection tolerance (see 3.1.9).

3.1.6 *corrective action*—procedures other than readjustment of the visual indicator setting to include repair or replacement of system components.

3.1.7 *deviation*—the difference between the test result(s) and the selected reference torque value, usually expressed as a percentage of the selected reference torque value.

3.1.8 *initial visual indicator setting*—the visual indicator setting derived from the binding manufacturer's release/retention adjustment chart.

3.1.9 *inspection tolerance*—the accepted difference between the reference torque value and the test result. Defined as ± 15 % of the reference torque value, or ± 3 Nm for twist and ± 10 Nm for forward lean, whichever is greater, or one horizontal column up or down from the selected reference

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² *Annual Book of ASTM Standards*, Vol 15.07.

torque value determined on the binding manufacturer's adjustment chart (see Appendix X3). Use as the criteria for prompt consultation of the binding manufacturer's troubleshooting procedures or application of a correction factor, should procedures not be available.

3.1.9.1 *Discussion*—In the case when an algorithm or table is used to provide a value, either may be used (differences may be insignificant).

3.1.10 *interchangeable*—applies to the free exchange of boots within a rental inventory without testing each new combination of system components.

3.1.11 *inward versus outward tolerance*—the accepted difference between test results about an axis perpendicular to the plane of the ski, usually from the toe piece component, and defined as within the inspection tolerance (see 3.1.9).

3.1.12 *limit for correction*—the accepted difference between the reference torque value and the test result(s), defined as $\pm 30\%$ of the reference torque value, or ± 5 Nm for twist and ± 20 Nm for forward lean, whichever is greater, or two horizontal columns up or down from the selected reference torque value determined on the binding manufacturer's adjustment chart (see Appendix X3). Used as the upper and lower limit for application of a correction factor.

3.1.13 *measured release value*—release torque value determined by the use of a testing device of the type defined in Annex A1 (see 3.1.21).

3.1.14 *noninterchangeable*—applies to the establishment of specific binding-boot combinations that are tested each time a new combination is created.

3.1.15 *random sampling*—a procedure in which every sampling unit in the inventory has an equal chance of being included in the sample.

3.1.16 *reference binding*—a unit that is typical of the bindings in inventory.

3.1.17 *reference boot*—a boot that is typical of the boots in inventory and satisfies the requirements of A1.1.3.

3.1.18 *reference torque value*—the nominal release torque value derived from a document compatible with Practice F 939 such as Annex A3 or information supplied by the binding or test device manufacturer.

3.1.19 *rental skier day*—the number of rental skiers (units) processed through a ski rental facility in a 24-h period.

3.1.20 *system*—a group of interacting components, usually comprised of a ski, binding, and boot (S-B-B).

3.1.21 *test result*—the middle quantitative value of three repetitions of the same test.

3.1.22 *troubleshooting*—the binding manufacturer's recommendations or procedures for analyzing system failure.

3.1.23 *visual indicator setting*—the setting displayed on the binding's release adjustment scale.

4. Summary of Practice

4.1 Prior to the beginning of each season, boots and bindings are inspected for compatibility and interchangeability using a testing device.

4.2 At specified intervals throughout the operating season samples are taken from rental inventory and inspected. Test results are used to determine sampling frequency and prompt corrective action when specified tolerances are exceeded.

5. Significance and Use

5.1 The purpose of this practice is to aid in providing the end user with an appropriate functioning system and release torque setting by providing the rental facility with an on-going program for monitoring the appropriateness of functional characteristics of the system. It is assumed that these procedures are integrated into the maintenance and operating procedures specified by the equipment manufacturers. This practice is not intended to create additional or redundant requirements for the rental facility. However, this practice should be the basis for the development of rental procedures if the equipment manufacturer's maintenance and operating procedures do not specifically state that they are in compliance with this practice. This practice will aid the rental facility in providing the end user with an appropriate release torque setting.

5.2 This practice is applicable to rental facilities that use releasable Alpine ski bindings. It is not intended as a method for evaluating equipment design.

6. Test Device

6.1 All tests specified in this practice are made with a device that indicates torque. Such a device should be inspected by the rental facility in accordance with Annex A2.

7. Equipment Inspection Requirements

7.1 *Preseason Inspection*—Prior to the beginning of each season and whenever new inventory is added, an inspection should be made of the components of the release system. Units that do not meet the specified tolerances are repaired, modified, or replaced.

7.1.1 A visual inspection for compatibility and interchangeability is performed on all boots in accordance with the procedures recommended by the binding manufacturer.

7.1.2 As a check on boots that are new to inventory, a single unit sample, by make, model, and size, is taken and tested in accordance with the procedures in Section 9. If a boot fails, all boots in the category are visually inspected for the defect and as a check, a 16-unit (or less if 16 are not available) random sample is taken and tested in accordance with the procedures in Section 9. If any boots in this sample fail, all remaining boots in the category are tested.

7.1.3 As a check on boots that have been accepted into inventory in a prior season, a 5% (not less than 16 nor more than 80-unit) sample is taken and tested in accordance with the procedures in Section 9. If a boot fails, all boots in that make, model, or age category are visually inspected for the defect. If the defect is found in another boot category, all boots in that category also are tested in accordance with the procedures in Section 9.

7.1.4 Boots that meet the criteria for compatibility but do not meet the criteria for interchangeability are used in non-interchangeable rental programs only.

7.1.5 Preseason tests for compatibility or interchangeability, or both, of the boot need not be made if the binding manufacturer's current operating procedures specifically state that the boot is not a functional component of the release system and that such tests are unnecessary.

7.1.6 Bindings used in an interchangeable rental program

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are inspected for appropriate function and valid release indicators in accordance with the procedures in Section 9.

7.1.7 Bindings used in a noninterchangeable system are tested for appropriate function and valid visual indicators whenever a new system is created, whenever called for as a result of the sampling procedure, or when recommended by the binding manufacturer.

7.1.8 Bindings that incorporate a single means of adjustment for all release directions are tested in either twist or forward lean but need not be tested for both during the preseason inspection. However, a 5 % (but not less than 16 nor more than 80-unit) random sample is tested in both directions by the procedure in Section 9. If a binding fails, a visual inspection for the defect is conducted on all bindings. All bindings, in any binding category in which a defective unit is found, are tested in accordance with the procedures in Section 9.

7.2 *In-Season Inspection*—At regular intervals, as specified in Section 8, samples are taken from the rental inventory and evaluated in accordance with the procedures in Section 9.

7.2.1 The inventory fails the sample if a Class I deviation is detected in more than 20 % of the units in the sample, or if a single Class II deviation is detected.

7.2.2 If a Class II deviation is detected in the sample, the cause must be identified and the entire rental inventory inspected for the defect and appropriate corrections made.

7.2.2.1 Class I deviations, when detected, need not be corrected.

7.2.3 If a Class III deviation is detected in the sample, all pertinent procedures as defined by the binding manufacturer are reviewed and corrective action taken.

7.3 *Incomplete Inspection*—An inspection of the type described in 7.3.1, 7.3.2, or 7.3.3 is conducted each time an incomplete rental system is assembled during the rental transaction.

7.3.1 The equipment is assembled, adjusted, and inspected according to normal rental procedures as defined in this practice, provided a new-to-inventory inspection, as described in this practice, has been conducted on the make, model, and shell size of the boot presented to the facility during the rental transaction. The condition of the boot presented to the facility should be representative of the shop's boot inventory.

7.3.2 The equipment is assembled, adjusted, and inspected according to normal rental procedures as defined in this practice, provided the boot meets the specific requirements of the binding manufacturer.

7.3.3 If the customer is offering his own skis/bindings for use with the shop's boots, then the equipment should be assembled, adjusted, and inspected according to the normal procedures used during the inspection of user owned equipment as defined in Practice F 1063. This procedure also may be followed whenever the customer's boot fails the inspection in 7.3.2, or the boot does not meet inventory requirements in 7.3.1.

8. Sampling Requirements

8.1 *Sample Size*—Sample size is 5 % of inventory, but not less than 16 nor more than 80 units.

8.1.1 Sample size may be based on average daily output if

rental output drops below 50 % of capacity over the sampling interval.

8.1.2 The sample is taken at any time during the sampling interval or may be spread over the period.

8.1.3 The sample represents both inventory available for rental and equipment in the condition in which it is returned, with an equal number of units drawn from each group. All units within such sample should be selected randomly (see 3.1.16).

8.2 *Sampling Frequency*—A sample of the size specified in 8.1 is taken every seven days of operation. If the facility fails a sample, daily sampling is instituted. Daily sampling is continued until two consecutive samples have passed. Normal sampling is then resumed. After two consecutive weekly (seven days of operation) samples have been conducted without a sample failure, the facility may institute a reduced sampling schedule of one sample per 14 days of operation. If any sample fails on the reduced schedule, a daily schedule is instituted.

8.2.1 Facilities that have an average daily output of fewer than 160 rental skier days/day (averaged on a weekly basis) may adopt an alternate procedure and sample, over the sampling interval, 5 % of average daily output, and delay evaluation of the inspection results until a total of 16 sampled units have been accrued. However, if a single Class II or Class III deviation is detected at any time, corrective action as described in 7.2.2 and 7.2.3 is taken. This alternative method is used with a normal (weekly) or daily sampling schedule but is inappropriate for a reduced schedule.

9. Sampling and Inspection Procedures

9.1 *Pre-Season Check*—Perform all tests in accordance with Annex A1.

9.1.1 *Boot Inspection*—Unless otherwise specified by the binding manufacturer, inspect boots as follows:

9.1.1.1 Select two reference bindings of the same model.

9.1.1.2 Clean and lubricate both bindings where the boot will contact them.

9.1.1.3 Adjust both bindings to obtain the test result as specified by the binding manufacturer using a typical boot of the sole length to be inspected.

9.1.1.4 Clean the lubricant from one binding with a liquid dishwashing detergent or cleaner recommended by the binding manufacturer. Clean all contact points and clearly label the binding to indicate that it has been cleaned. Clearly label the remaining binding to indicate that it has been lubricated.

9.1.1.5 Select all boots of a given sole length and visually inspect as specified by the binding manufacturer.

9.1.1.6 Make all necessary binding-to-boot adjustments as specified by the binding manufacturer to accommodate the selected boots.

9.1.1.7 Using the clean binding and the release testing device, observe the twist test result in one direction only.

9.1.1.8 Using the clean binding and the testing device, observe the forward lean test result, unless the binding manufacturer specifies that the test is not required to further verify compatibility.

9.1.1.9 Using the lubricated binding and the testing device, observe the twist test result(s) in both directions.

9.1.1.10 Using the lubricated binding and the testing device,