Designation: F1064 – 21

Standard Practice for Sampling and Inspection of Complete and Incomplete Alpine Ski/Binding/Boot Systems in Rental Applications[1]

This standard is issued under the fixed designation F1064; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

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.

1.3 This practice is not intended for use with other ski boot or bindings systems, such as alpine touring or pin/tech systems. Use of ski boots or ski bindings that do not meet the requirements for alpine ski equipment can cause unexpected release and retention characteristics.

1.4 This standard does not apply to a ski/binding/boot system that is rented to one individual for the majority of a season and not returned to the rental inventory until the end of the season (often referred to as a seasonal rental); such systems will follow the practice provided in Practice F1063.

NOTE 1—Refer to Practice F1063 for equivalent procedures and tolerances for retail systems.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F939 Practice for Selection of Release Torque Values for Alpine Ski Bindings

F1063 Practice for Functional Inspections and Adjustments of Alpine Ski/Binding/Boot Systems

3. Terminology

3.1 *Definitions:*

3.1.1 *system*—a group of interacting components, usually comprised of a ski, binding, and boot.

3.1.2 *incomplete system*—applies when a skier provides one of the components of a ski/binding/boot system, such as his or her own boots. In this case, the system is treated in accordance with 7.3.

3.1.3 *unit (also called "rental unit")*—a half pair of ski equipment (ski-binding-boot system), consisting of a boot, a binding, and a ski or any individual system components (for example, a single boot or a single ski-binding).

3.1.4 *visual indicator setting*—the setting displayed on the binding's release/retention adjustment scale.

3.1.5 *measured release value*—release torque value determined by the use of a testing device of the type defined in Annex A1.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

3.1.7 *inspection range*—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 row up or down from the selected reference torque value determined on the binding manufacturer's adjustment chart.

3.1.7.1 *Discussion*—Any of the three methods described above for determining the range may be used as differences will be insignificant.

3.1.8 *in-use range (also called "re-adjustment range")*—the maximum difference between the reference torque value and the test result that does not require corrective action. Defined ±30 % of the reference torque value, or ±6 Nm for twist and ±20 Nm for forward lean, whichever is greater, or two horizontal rows up or down from the selected reference torque value determined on the binding manufacturer's adjustment chart. Results in this range are used to determine the frequency of sampling. Results that are beyond the inspection range but still in this range do not require corrective action.

3.1.8.1 *Discussion*—Any of the three methods described above for determining the range may be used as differences will be insignificant.

3.1.9 *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.

3.1.10 *corrective action*—procedures other than readjustment of the visual indicator setting that include repair or replacement of system components or removing components from a rental fleet.

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

3.1.12 *clockwise versus counterclockwise tolerance*—the accepted difference between test results about an axis perpendicular to the plane of the ski, usually from the toe piece component.

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

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

3.1.15 *reference boot*—a boot that is typical of the boots in inventory and is chosen using the method in A4.1 and satisfies the requirements of A1.1.3.

3.1.16 *reference torque value*—the nominal release torque value derived from a document compatible with Practice F939 such as Annex A3 or information supplied by the binding or test device manufacturer.

3.1.17 *manufacturer pre-mounted ski-binding system*—a combination of new skis and new bindings that have passed inspection and testing by the original equipment manufacturer prior to delivery to the rental shop.

3.1.18 *rental skier days*—the number of rental skiers processed through a ski rental facility in a 24-h period.

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

4. Summary of Practice

4.1 Prior to the beginning of each season, components of boot/binding systems are inspected and tested individually for compatibility and proper function. Testing must be conducted with a device as defined in Annex A1 of Practice F1063.

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 ski/binding/boot system and associated release/retention characteristics by providing the rental facility with an ongoing 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 (for example, in manufacturer-provided technical manuals). 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 a system that provides appropriate release/retention characteristics.

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 designs or types, such as alpine touring equipment. Mixing components of different system types (for example, using an alpine touring boot in an alpine binding) is discouraged.

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 annually by the rental facility and calibrated biannually by a qualified technician 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 ski/binding/boot system. Units that do not meet the specified tolerances are repaired, modified, or replaced.

7.1.1 A visual inspection for compatibility 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 shell size, is taken and tested

in accordance with the procedures in 9.1.1 and 9.1.2. If for any shell size and type, a boot does not produce acceptable results, all new boots are visually inspected 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 9.1.1 and 9.1.2. If any boots in this sample do not produce acceptable results, all remaining new boots of that make, model, and shell size 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) random sample of each make, model, and shell size is taken and tested in accordance with the procedures in 9.1.1 and 9.1.2. If a boot does not provide acceptable results, all boots in that make and model are visually inspected. If another boot of the same make, model, and shell size does not pass visual inspection, then all boots of that make, model, and shell size are tested in accordance with the procedures in Section 9. Any boot in this series of testing that does not produce acceptable results needs to be repaired, replaced, or removed from the rental fleet.

7.1.4 Bindings are inspected for appropriate function and valid visual indicator setting in accordance with the procedures in 9.1.3.

7.1.5 Each binding in the rental fleet is tested in the preseason except for new manufacturer pre-mounted ski-binding systems that include systems in which the toe and heel components are slid onto pre-mounted or integrated tracks. For these new manufacturer pre-mounted ski-binding systems, a 5 % (but not less than 16 nor more than 80-unit) random sample of bindings is tested in both twist and forward lean by the procedure in 9.1.3.

7.1.6 If a binding does not produce results in the inspection range when using a test reference boot, the binding manufacturer's troubleshooting procedures are initiated and all bindings in the category are tested in accordance with the procedures in 9.1.3. The bindings may be retested once after the troubleshooting procedures. If the bindings continue to produce results outside the inspection range, they must be removed from the rental fleet.

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 9.2.

7.2.1 If more than 20 % of the units in the sample produce results outside the inspection range but within the in-use range, or if a single system produces results outside the in-use range, follow the manufacturers troubleshooting procedures and initiate daily testing as required by Section 8.

7.2.2 If a system produces results outside the in-use range, the cause must be identified and the entire rental inventory inspected and appropriate corrections made. All pertinent procedures as defined by the binding manufacturer are reviewed and corrective action taken with the entire rental inventory.

7.2.2.1 Systems that produce results outside the inspection range but within the in-use range, need not be corrected.

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.

7.3.2 If the customer is offering his or her own boots, the boots must pass a visual inspection, must be representative of the condition of the shop's boot inventory, and be compatible with the facility's rental ski/bindings. If the customer's boots meet these requirements, then the equipment is assembled, adjusted, and inspected according to normal rental procedures as defined in this practice. If the boots do not meet these requirements, then these boots are not to be used with the facility rental skis/bindings.

NOTE 2—It is appropriate to offer alternative rental or retail options to the customer for boots, if the customer's boots do not meet the requirements described in 7.3.2.

7.3.3 If the customer is offering his or her 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 F1063.

NOTE 3—It is appropriate to offer alternative rental or retail options to the customer for skis/bindings, if the customer's skis/bindings do not produce acceptable results during inspection/testing per 7.3.3.

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 3.1.13).

8.2 *Sampling Frequency*—A sample of the size specified in 8.1 is taken every seven days of operation. If the in-season produces any results outside of the in-use range, or if 20 % or more systems are outside the inspection range and within the in-use range, then daily sampling is instituted.

8.2.1 If daily sampling has been initiated, it continues until the results of two consecutive in-season checks produce results in the inspection range or less than 20 % of systems are outside the inspection range and within the in-use range; normal sampling frequency is then resumed.

8.3 *Sampling Size and Frequency for Lower Volume Facilities*—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 size, 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 system produces a result outside the in-use range at any time, corrective action as described in 7.2.2 is taken.

9. Sampling and Inspection Procedures

9.1 *Preseason 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, observe the forward lean test result unless the binding manufacturer specifies that the test is not required to further verify compatibility.

9.1.2 *Boot Evaluation*—Evaluate the test results for each boot as follows:

9.1.2.1 In each lubricated binding twist test, the clockwise versus counterclockwise test results should be within the inspection range of the value specified by the manufacturer.

9.1.2.2 The test result in twist, observed in the clean test should be within the inspection range specified by the manufacturer. If not, or the difference between the clean and lubricated test results is greater than 20 %, initiate the binding manufacturers troubleshooting procedures and restart testing for the boot.

9.1.2.3 The forward lean test result observed in the clean test should be within the inspection range specified by the manufacturer.

9.1.2.4 Remove from inventory any boot that does not satisfy 9.1.2.1, 9.1.2.2, and 9.1.2.3 and cannot be corrected.

9.1.2.5 Do not use a ski/binding/boot system or any boot that does not satisfy 9.1.2.1, 9.1.2.2, and 9.1.2.3 and cannot be corrected.

9.1.3 *Binding Inspection*—Inspect all bindings as follows:

9.1.3.1 Select a reference boot with sole length as specified by the binding manufacturer or that is commonly used with equipment in accordance with A4.1.

9.1.3.2 Clean each reference boot.

9.1.3.3 Adjust the binding's visual indicator to "5" for adult boots or "2" for junior boots, unless otherwise specified by the binding manufacturer.

9.1.3.4 Exercise the binding/boot system through the range of elastic travel as specified by the binding manufacturer. This exercise should include at least one release of the boot in each direction of release specified by the manufacturer.

9.1.3.5 Using the testing device, observe the test results in each direction of release specified by the manufacturer.

9.1.3.6 Make all other inspections specified by the binding manufacturer.

9.1.4 *Binding Evaluation*—Evaluate the test results for each binding system as follows:

9.1.4.1 The clockwise and counterclockwise test results in twist should be within the inspection range. If the test results fall near the opposite limits of the inspection range (see the binding manufacturer's technical manual for more details), the binding manufacturer's procedure for evaluation on nonsymmetrical release shall be implemented.

9.1.4.2 Remove from inventory any binding that does not satisfy 9.1.4.1.

9.2 *In-Season Routine Sampling and Inspection*—Sample the inventory in accordance with Section 8 and perform all tests in accordance with Annex A1.

9.2.1 *Inspection*—Inspect each sample unit in the following sequence:

9.2.1.1 Make a visual inspection of all binding-to-boot fitting indicators and all components in accordance with boot and binding manufacturers' recommendations.

9.2.1.2 Inspect forward lean elastic travel in accordance with A1.1.

9.2.1.3 Test the forward lean release torque.

9.2.1.4 Inspect elastic travel in all other directions of release in accordance with A1.1.

9.2.1.5 Test the twist release torque in one direction (clockwise or counter-clockwise) only.

9.2.1.6 Perform all other tests and inspections required by the binding manufacturer.

9.2.2 *Evaluation*—Evaluate the results of the sample inspection as follows:

9.2.2.1 Sum and document the results of the system as belonging to one of three categories: *(1)* inspection range, *(2)* in-use range (but outside the inspection range), and *(3)* outside the in-use range.

9.2.2.2 For any system outside the in-use range, take corrective action specified in 7.2.2.

9.2.2.3 Note the percentage of the sample in the in-use range and determine if additional action is needed as defined in 7.2.1.

9.2.2.4 Determine the schedule for sampling based on the inspection results and the criteria defined in 8.2.

10. Keywords

10.1 binding; boot system testing; rental standard; ski

ANNEXES

(Mandatory Information)

A1. FUNCTIONAL AND RELEASE TEST REQUIREMENTS

A1.1 Description of Functional Inspections

A1.1.1 *Test for Elastic Travel and Recentering*—The system should be exercised to check that the boot can travel a distance specified by the manufacturer and return freely to within 2 mm of the original position. This test should be made in all directions of release and in a manner specified by the binding manufacturer. If no displacement is specified, then 5 mm measured at the toe or heel (as appropriate) should be used and the test made by any device or method capable of displacing the boot the necessary distance.

A1.1.2 *Test for Symmetrical Release*—The system should be tested for twist release in both the clockwise and counterclockwise directions with a device of the type specified in Annex A2. (Not necessary for in-season inspection).

A1.1.3 *Test of Binding/Boot, Compatibility*—The boot should be of a shape, composition, construction, and condition acceptable to the binding manufacturer. Functional inspections specified by the binding manufacturer to determine the compatibility of the boot and binding should be performed. If no functional inspection procedures are specified by the binding manufacturer, a functional inspection should be made to determine the difference in release torque between a clean, dry system and the same system after lubrication of all binding-boot interfaces. This inspection should be made in all directions of release specified by the binding manufacturer, using a testing device of the type specified in Annex A2.

A1.1.3.1 The lubricant used for this test should be applied in a thin film and may be of a type normally accepted in the maintenance of the binding such as a grease or silicone spray lubricant or a soap/detergent and water solution.

A1.1.3.2 If there is reason to believe that the binding-boot interface has been contaminated with a lubricant prior to the clean tests, a common dishwashing soap or detergent may be used, provided all surfaces are flushed with clean water afterward.

A1.2 Release Inspection

A1.2.1 *Tests for Twist Release*—This test is made to determine the torque required to release the binding in twist about an axis perpendicular to the plane of the boot sole. This test is made using a device of the type described in Annex A2. Test results may be used to calibrate the binding to the desired release torque or to validate the visual indicator. Tests may be made of the entire release/retention system or using a reference boot (preseason tests only).

A1.2.2 *Tests for Forward Lean Release*—This test is made to determine the torque required to release the binding in forward lean. This test is made using a testing device of the type described in Annex A2. If no independent means is provided to adjust the forward lean release, this test is used to check that the ratio of twist to forward lean is as specified by the manufacturer. Test results may be used to calibrate the binding to the desired release torque or to validate the visual indicator. Tests may be made of the entire release/retention system using a reference boot (preseason tests only).

A1.2.3 *Other Release Tests*—Tests of the type in A1.2.1 and A1.2.2 should be made in any other direction specified by the manufacturer and in any directions for which an independent release adjustment is provided.

A1.3 Test Conditions

A1.3.1 *Visual Indicator Setting for Functional Tests*—Functional tests are made at a visual indicator setting of “5” for systems using adult boots and “2” for systems using child boots, unless otherwise specified by the manufacturer.

A1.3.2 *Visual Indicator Setting for Validating Release Indicator*—Tests to validate the visual indicator are made at approximately mid-range on the visual indicator adjustment scale of the binding or the selected preset visual indicator setting, unless otherwise specified by the manufacturer.

A1.3.3 *Preconditioning Binding*—The binding is cycled three times in all directions prior to calibration of the visual indicator setting or validation of the visual indicator.

A1.3.3.1 The use of a lubricant in this test is not intended to improve performance of the system in use, but to reduce the influence of the friction.

A1.3.3.2 Unless the procedure of the shop includes preconditioning prior to each rental, bindings tested as part of the in-season sampling and inspection program are not preconditioned.

A1.3.4 *Temperature*—Tests are performed at temperatures between 10 and 25°C (55 and 80°F).

A1.3.5 *Load Rate*—Tests should be performed at a load rate specified by the manufacturer of the testing device or in accordance with the binding manufacturer’s recommendations. If no recommendations are provided, the load required to release the boot from the binding should be applied smoothly such that the time to achieve release is between 1 and 5 s.

A2. SYSTEM TESTER INSPECTION REQUIREMENTS

A2.1 Same as Annex A1 of Practice F1063.

A3. RELEASE TORQUE SELECTION PROCEDURES

A3.1 See Appendix X1 through X3 of Practice F939.

A4. FLOWCHARTS OF PRACTICE F1064 PROCEDURES

A4.1 See Figs. A4.1-A4.4 for flowcharts outlining the procedures in Practice F1064.

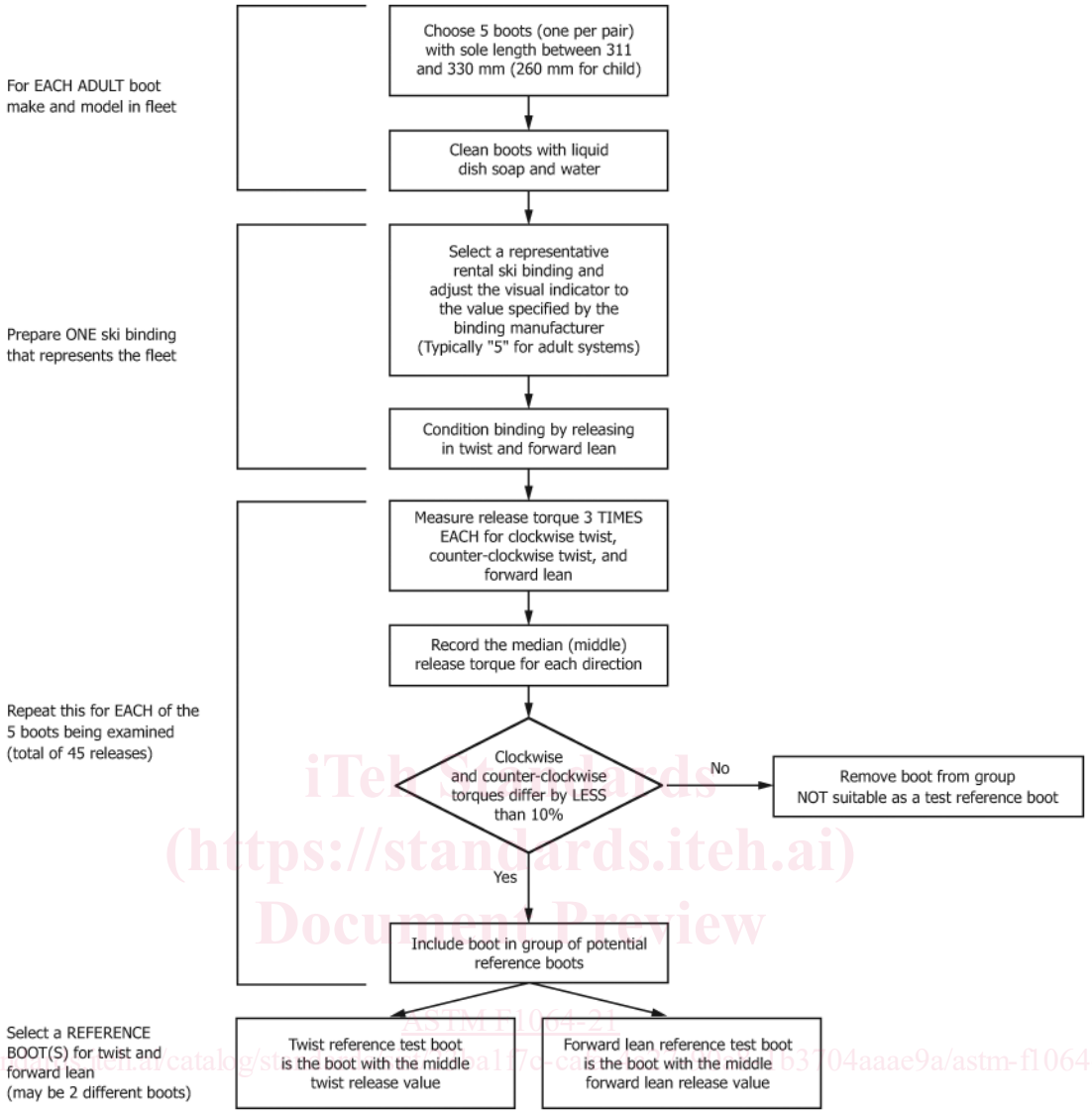

FIG. A4.1 Selecting Test Reference Boot Procedures