Designation: F3104 – 14

Standard Test Methods for Evaluating Design and Performance Characteristics of Externally Loaded Strength Training Equipment, Strength Training Benches and External Weight Storage Equipment[1]

This standard is issued under the fixed designation F3104; 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

The goal of these test methods is to provide reliable and repeatable methods for the evaluation of Externally Loaded Strength Training Equipment, Strength Training Benches and External Weight Storage Equipment. Users of these machines must recognize, however, that conformance to a standard will not necessarily prevent injuries. Like other physical activities, exercise involving this equipment involves the risk of injury, particularly if the equipment is not maintained or used properly.

1. Scope

1.1 These test methods specify procedures and apparatus used for testing and evaluating Externally Loaded Strength Training Equipment, Strength Training Benches and External Weight Storage Equipment for compliance to Specification F3105. Both design and operational parameters will be evaluated. Where possible and applicable, accepted test methods from other recognized bodies will be used and referenced.

1.2 *Requirements*—This equipment is to be tested in accordance with this test method or Test Methods F2571 for all of the following parameters:

1.2.1 Stability,
1.2.2 Edge and corner sharpness,
1.2.3 Tube ends,
1.2.4 Entrapment and pinch points,
1.2.5 Weight disc retention,
1.2.6 Function of adjustments and locking mechanisms,
1.2.7 Training weight post loading,
1.2.8 Storage weight post loading,
1.2.9 Stop height verification,
1.2.10 Stop load drop test,
1.2.11 Barbell hook dimensions,
1.2.12 Catch hook load drop test,
1.2.13 Barbell support/frame impact test,
1.2.14 Intrinsic loading,
1.2.15 Extrinsic loading,
1.2.16 Endurance loading, and
1.2.17 Documentation and warnings verification.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1749 Specification for Fitness Equipment and Fitness Facility Safety Signage and Labels
F2216 Specification for Selectorized Strength Equipment
F2571 Test Methods for Evaluating Design and Performance Characteristics of Fitness Equipment
F3105 Specification for Externally Loaded Strength Training Equipment, Strength Training Benches and External Weight Storage Equipment

2.2 *European Standards:*[3]

EN 957–1 Stationary Training Equipment—Part 1: General Safety Requirements and Test Methods
EN 957–2 Stationary Training Equipment—Part 2: Strength Training Equipment, Additional Specific Safety Requirements and Test Methods

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

[1] These test methods are under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and are the direct responsibility of Subcommittee F08.30 on Fitness Products.

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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] Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, http://www.cen.eu.

3.1.1 *normal operation, n*—the operation of the equipment as defined by the manufacturer.

4. Significance and Use

4.1 The purpose of this document is to provide valid and repeatable test methods for the evaluation of Externally Loaded Strength Training Equipment, Strength Training Benches and External Weight Storage Equipment assembled and maintained according to the manufacturer's specifications. Use of these test methods in conjunction with Specification F3105 is intended to maximize the reliability of the equipment's design and reduce the risk of serious injury resulting from design deficiencies.

5. Certification

5.1 These test methods permit self-certification. It is recommended that each manufacturer employ an independent laboratory to evaluate and validate that their designs and test procedures conform to and comply with these test methods and Specification F3105.

6. Units of Measure

6.1 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

7. Sample Preparation

7.1 Assemble and adjust the equipment according to the manufacturer's instructions. Remove upholstered pads from the sample. On machines that are fully assembled, verify according to the manufacturer's instructions that all components are functioning and that they have been adjusted and aligned properly. Unless otherwise stated, the machine must pass the tests without adjustment from this initial condition. The equipment shall be provided with the largest amount of weight intended to be used with the equipment as stated by the manufacturer for the model to be tested.

7.2 The individual test methods will describe any variations or modifications that are required to the test sample.

8. Test Methods and Procedures

8.1 *Stability:*

8.1.1 This equipment shall be tested with and without the simulated user load in the orientation that is most obviously unstable. For Type 1 and Type 2 equipment as defined in Specification F3105 the equipment is to be tested with the maximum rated load as stated by the manufacturer applied to the training weight posts with no additional weight stored on the weight storage posts (if so equipped). For Type 3 and 4 equipment the equipment is to be tested with a simulated user load and an applied load equal to the rated lifting load applied to the bench as defined below. Multiple tests will be performed as defined below.

8.1.2 *Apparatus and Set-Up*—Place sample on a non-skid surface inclined at 10° in the orientation that is least stable. The sample shall rest on the supporting surface without anchoring. Determine how the user is placed oriented relative to the machine to perform the exercise (that is, seating, standing, or prone) and then determine how the user's body weight is distributed onto the user support surfaces. For the tests that require a user load, apply a load equal to 100 kg (220 lb) simulating the user's weight and its distribution in the vertical direction at the point(s) of user contact. The load shall be applied in the most onerous condition for the machine type being evaluated. As an example, for a seated user, the user support surface shall be adjusted to the uppermost position (if adjustable) and the center of gravity of the 100 kg (220 lb) load shall be positioned approximately 150 mm (5.9 in.) above the user support surface. Possible methods of providing this load include, but are not limited to, pneumatic cylinder(s) or dead weights. Stability is to be evaluated with weight discs applied to one side and both sides of the machine. Determine most onerous condition and test the equipment in that orientation.

8.1.3 *Calibration*—Using an angle measuring instrument accurate to within 0.1°, verify the non-skid surface is 10 ± 0.5°. Calibrate the load measurement apparatus to confirm accuracy to within ±20 N (4.5 lb) over entire loading range.

8.1.4 *Procedure*—Test the sample as follows:

8.1.4.1 With the sample machine (no user load applied) positioned on the tilt surface, verify that the sample does not tip over with the resistance means in the rest position and no weight load on the training weight posts.

8.1.4.2 Using the aforementioned load apparatus, distribute a vertical load equal to 100 kg (220 lb) ± 5 % in a non-impact manner to the specimen where the user contacts the machine during normal operation. (If only a portion of the user's body is supported by the machine during operation, the 100 kg (220 lb) simulated user weight shall be reduced by the appropriate amount.) Load the maximum rated weight (as stated by the manufacturer) onto the lifting arm, bar or weight support structure and retain the weights from sliding. Raise and support the lifting arms and weights to simulate the furthest point in the range of travel as encountered during normal operation of the machine by a user of 1.8 m (74 in.) stature. Verify that the sample does not tip over.

8.1.4.3 Repeat 8.1.4.1 and 8.1.4.2 with the maximum amount of weight only on one side of the lifting arm or weight structure.

8.1.4.4 Repeat 8.1.4.1 and 8.1.4.2 with the sample oriented in any other directions of potential instability and with weights only on one side of the lifting arm or weight structure.

8.1.4.5 For Type 3 and 4 equipment load the bench vertically at the point(s) of user contact. The equipment is positioned on the tilt table in its most unstable orientation. If a seat is present then the seat shall be loaded with 45.5 kg (100 lb) simulating the 100 kg (220 lb) user's lower body. The applied load to the remainder of the bench is based on the load rating of the bench [for example: 225 kg (495 lb) of lifting load] plus the upper body weight of the user [54.5 kg (119.9 lb)]. Apply this load to the bench, without inducing a torque to the bench, at the point of user contact with the bench. The load shall be applied to the bench along its centerline using a 305 mm (12 in.) square plate.

8.1.5 *Pass/Fail Criteria*—In any of the above test conditions, or in any other weight configuration that will be unstable, the sample shall not tip over.

8.1.6 *Precision and Bias*—No information is presented about either the precision or bias of test 8.1 for measuring stability since the test result is non-quantitative.

8.2 *Adjustable Stops:*

8.2.1 This test is a visual inspection of the sample to ensure that adjustable stops (if required) are present and functional.

8.2.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1.

8.2.3 *Calibration*—Verify that the measuring device is accurate to 1.5 mm (0.06 in.).

8.2.4 *Procedure*—Visually confirm that adjustable stops are present on both sides of the machine and that they adjust with minimal effort. Verify on sled leg press machines that a dead stop is present that stops the lower edge of the carriage at least 266 mm (10.5 in.) from the front edge of the seat pad. Verify on Smith, Squat and Lifting Cage apparatus that one set of stop positions sets the lifting bar at least 711 mm (28 in.) above the floor when the lifting bar is resting on the adjustable stops. Verify the presence of a warning label instructing to not place the stops lower than this position when doing squat exercises.

8.2.5 *Pass/Fail Criteria*—Adjustable stops must be present and function on all Type 2 equipment. Sled leg press machines must have a dead stop that stops the carriage at least 266 mm (10.5 in.) from the edge of the seat. Smith, Squat, and Lifting Cage apparatus must have one set of stop position that stops the lifting arm at least 711 mm (28 in.) from the floor and a warning label must be present on both sides of the machine.

8.2.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.2 for adjustable stops since the test result is non-quantitative.

8.3 *Weight Disc Retention:*

8.3.1 This test is a visual inspection of the sample to ensure that the weight discs are retained onto the lifting arms, bar or weight structure.

8.3.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1.

8.3.3 *Calibration*—Verify that angle measuring instrument is accurate to within 0.1°.

8.3.4 *Procedure*—Visually confirm that the weight plates are retained on the lifting structure by the presence of bar clamps, collars, pins or similar means. If angular placement of the weight posts is the method of retention, then verify that the angle of the weight post with respect to horizontal is at least 2° throughout the entire range of movement of the lifting structure.

8.3.5 *Pass/Fail Criteria*—The weight discs shall be retained. The presence of clamps or similar means or angulation of 2° or greater must be present.

8.3.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.3 for evaluating weight disc retention since the test result is non-quantitative.

8.4 *Weight Disc Spacing – Storage Posts:*

8.4.1 This test is a visual inspection of the sample to ensure that the weight storage posts are spaced adequately.

8.4.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1.

8.4.3 *Calibration*—Verify that the measuring device is accurate to 1 mm (0.04 in.).

8.4.4 *Procedure*—Place the maximum weight plate size (as recommended by the manufacturer) onto each weight storage post. Measure the spacing between the weight discs. The spacing shall be 25 mm (0.98 in.) or greater.

8.4.5 *Pass/Fail Criteria*—The weight stack must begin and end the test in the same rest position and must not move unless it is displaced intentionally by a lifting force applied to the lifting arm.

8.4.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.4 for evaluating weight disc spacing since the test result is non-quantitative.

8.5 *Training Weight Post Loading:*

8.5.1 This test is a visual, physical, and functional inspection of the weight posts used to support the training load on the equipment to ensure that they meet the loading parameters of Specification F3105.

8.5.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. Determine whether the sample is designed for consumer or institutional use. Obtain from the manufacturer the maximum load rating for each weight training post. Provide a means (pneumatic, hydraulic, or similar) for providing a load vertically downward to the training post that is 6 times the maximum value stated by the manufacturer for institutional equipment and 4 times the maximum value for consumer equipment.

8.5.3 *Calibration*—Calibrate the load measurement apparatus to confirm accuracy to within ±50 N (±11 lb).

8.5.4 *Procedure*—Obtain and record from the manufacturer the maximum load amount that the weight support post is subjected to during operation of the sample machine. Secure a load application device to the center of the weight support post. The post may either be pushed or pulled downward with the loading device. Apply a load to the weight post equal to 6 times the maximum load stated above (for institutional equipment) and 4 times the maximum for consumer equipment. Maintain this load for 5 min. Repeat the test for each of the weight support posts.

8.5.5 *Pass/Fail Criteria*—If the weight post fails to support the load for 5 minutes or if the weight support post fails structurally then the weight support post shall fail the test.

8.5.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.4 for evaluating training weight post loading since the test result is non-quantitative.

8.6 *Storage Weight Post Loading:*

8.6.1 This test is a visual, physical, and functional inspection of the weight posts used for storage on the equipment to ensure that they meet the loading parameters of Specification F3105.

8.6.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. Determine whether the sample is designed for consumer or institutional use. Obtain from the manufacturer the maximum load rating for each weight storage post. Provide a means (pneumatic, hydraulic, or similar) for providing a load vertically downward to the storage post that is 4 times the

maximum value stated by the manufacturer for institutional equipment or 2.5 times the maximum value for consumer equipment.

8.6.3 *Calibration*—Calibrate the load measurement apparatus to confirm accuracy to within ±50 N (±11 lb).

8.6.4 *Procedure*—Obtain and record from the manufacturer the maximum load amount that the weight storage post is subjected to. Secure a load application device to the center of the weight storage post. The post may either be pushed or pulled vertically downward with the loading device. Apply a load to the weight post equal to 4 times the maximum load stated above (for institutional equipment) and 2.5 times the maximum for consumer equipment. Maintain this load for 5 min. Repeat the test for each of the weight support posts.

8.6.5 *Pass/Fail Criteria*—If the weight storage post fails to support the load for 5 minutes or if the weight storage post fails structurally then the weight storage post shall fail the test.

8.6.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.5 for evaluating weight storage post loading since the test result is non-quantitative.

8.7 *Drop Load Test – Stops:*

8.7.1 This test is a drop load test onto the adjustable and fixed stops of the sample. The purpose is to ensure the integrity of the stops.

8.7.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. A system or apparatus shall be employed that drops the maximum training load onto the stops from a height of 457 mm (18 in.).

8.7.3 *Calibration*—Verify that the measuring device is accurate to 1.5 mm (0.06 in.).

8.7.4 *Procedure*—Load the lifting arm or carriage with the maximum training weight as stated by the manufacturer and retain with collars or other appropriate means. Raise the bar or carriage to a height of 457 mm (18 in.) above the fixed or adjustable stop to be tested. Release the load allowing the bar or carriage to free fall and strike the stops. Raise the bar or carriage and repeat the drop for 10 cycles for institutional equipment or 1 cycle for consumer equipment.

8.7.5 *Pass/Fail Criteria*—The stops shall not break and the bar or carriage assembly shall still support the load.

8.7.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.6 for evaluating stop drop load test since the test result is non-quantitative.

8.8 *Drop Load Test – Catch Hook:*

8.8.1 This test is a drop load test onto the barbell support hooks of the sample. The purpose is to ensure the integrity of the hooks.

8.8.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. A system or apparatus shall be employed that drops the maximum training load onto the support hooks from a height of 150 mm (5.9 in.).

8.8.3 *Calibration*—Verify that the measuring device is accurate to 1.5 mm (0.06 in.).

8.8.4 *Procedure*—Load the lifting bar with the maximum training weight as stated by the manufacturer and retain with collars or other appropriate means. Raise the bar to a height of 150 mm (5.9 in.) above the rest surface of the bar support hook. Release the load allowing the bar or carriage to free fall and strike the hook. Raise the bar or carriage and repeat the drop for 10 cycles for institutional equipment or 1 cycle for consumer equipment.

8.8.5 *Pass/Fail Criteria*—The support hooks shall not break.

8.8.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.7 for evaluating support hook drop load test since the test result is non-quantitative.

8.9 *Catch/Frame Impact Testing:*

8.9.1 This test is an impact load test onto the side frame structure of Type 3 equipment as defined in Specification F3105. The purpose is to ensure the integrity of the frame structure.

8.9.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. A system or apparatus shall be employed that dynamically impacts the maximum training load onto the barbell support frames. This load shall strike both side frames 38 mm (1.5 in.) down from the uppermost end of the frames from a distance of 300 mm (11.8 in.). An acceptable construction of the test apparatus would be a pendulum structure that supports the training bar above the bench or seat and is designed and configured so that when released the load pivots backwards and strikes the frame at the point described above.

8.9.3 *Calibration*—Verify that the measuring device is accurate to 1.5 mm (0.06 in.).

8.9.4 *Procedure*—Load the training bar of the test structure with the maximum training weight as stated by the manufacturer and retain with collars or other appropriate means. Position the bar so that it strikes the both frames at the same time, 38 mm (1.5 in.) down from their ends from a distance of 305 mm (12 in.). Release the load allowing the bar to swing and strike the uprights. Reposition the bar and repeat the impact for 10 cycles.

8.9.5 *Pass/Fail Criteria*—The frame structure shall not break or collapse and the barbell support hooks shall still support the load.

8.9.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.9 for evaluating catch/frame impact load test since the test result is non-quantitative.

8.10 *Barbell Support Hook Dimensional Verification:*

8.10.1 This test is a visual inspection and measurements of the barbell support hooks present on Type 3 strength training benches.

8.10.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. Support across the barbell support hooks a 30 mm (1.2 in.) diameter bar.

8.10.3 *Calibration*—Verify that the measuring device is accurate to 1 mm (0.04 in.).

8.10.4 *Procedure*—Inspect and measure the barbell support hooks and verify that they fall within the parameters specified in Specification F3105.

8.10.5 *Pass/Fail Criteria*—Barbell support hooks with dimensions falling outside of those specified in Specification F3105 shall fail test.

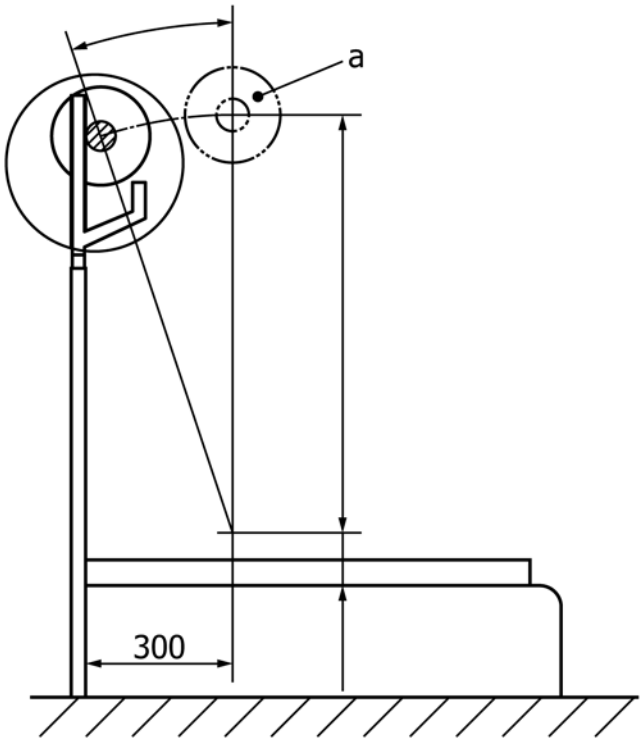

FIG. 1 Frame Impact Test

8.10.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.8 for evaluating barbell catch dimensions. The accuracy and repeatability is based on the measuring device and the individual conducting the test.

8.11 *Endurance Load Testing:*

8.11.1 *Endurance Cycle Testing*—This test is a visual and physical inspection of the specimen to ensure that it shall withstand endurance cycles set forth in Specification F2216 without failure.

8.11.2 *Apparatus and Set Up*—The sample shall be set-up as described in 7.1 with the maximum training resistance available for the product. It is acceptable, for this test, to anchor the machine to the floor to prevent "walking." Note and record whether the specimen is intended for consumer or institutional use. Obtain instruction or a descriptive explanation of the function of the sample machine from the manufacturer. A nonimpact method of cycling the machine through the point of maximum structural loading, as defined by the manufacturer, shall be provided. A method of recording the number of cycles shall be provided. A method of loading the machine with extrinsic loads experienced during the cycling of the machine shall be provided.

8.11.3 *Calibration*—Verify the accuracy of the cycle counting device to ±1 cycle.

8.11.4 *Procedure*—Determine from the manufacturer's specifications the maximum range of travel for the machine. Construct and attach to the lifting means of the machine an apparatus capable of moving the lifting arm through at least 80 % of this range or to the point of maximum resistance of the machine. The testing apparatus shall move the lifting means in the same manner that the user does. For example, if the user contacts the lifting means in two locations then the testing apparatus must do so as well. If during the course of operation the machine receives loading from the user via the lifting means then this shall be considered and figured into the design of the testing apparatus. If the user's body weight is a factor in the loading of the machine during cyclic operation then 135 kg (300 lb), simulating a user, shall be attached to the user support surface at the point of user contact. For Type 2 equipment the lifting apparatus shall move the carriage through a stroke of at least 150 mm (5.9 in.).

(1) The design of the testing apparatus will be unique and different for each product tested. Careful consideration shall be given by the testing facility as to how the test apparatus is constructed and they shall communicate with the manufacturer prior to commencing the test to verify that the apparatus functions in a manner similar to how a user would actually use and interface with the machine.

(2) Verify that the counter cycles for each repetition of the machine. Verify that after each repetition the load at the user means returns to zero prior to the execution of the next repetition. This may be done with a load cell or simple visual examination of the system. If the test apparatus is to run unattended then it shall be outfitted with a means of stopping if failure occurs on the sample. Begin the test. Periodically make and record observations during the test.

(3) If the specimen has multiple stations then replace the shared components, as specified in Specification F2216, and repeat the test on the remaining stations.

(4) Upon completion of the cycles specified in Specification F2216 (250 000 cycles for institutional equipment and 14 000 cycles for consumer products) reinstall the upholstered pads and use the machine according to the instructions provided by the manufacturer.

8.11.5 *Pass/Fail Criteria*—Machines or components that fail to attain the minimum number of cycles specified in Specification F2216 (250 000 cycles for institutional equipment and 14 000 cycles for consumer products) shall fail the test. Machines that fail to function as per the operation instructions provided by the manufacturer after completion of the test shall fail the test.

8.11.6 *Precision and Bias*—No information is presented about either the precision or bias of test 8.10 for endurance cycling since the test result is non-quantitative.

8.12 *Load Rating:*

8.12.1 This test is a loading test of the equipment to verify the load rating as specified by the manufacturer.

8.12.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. Provide a means (pneumatic, hydraulic, or similar) for providing a load to the machine or bench at the point of user load application that is result of the equation specified in Specification F3105.

8.12.3 *Calibration*—Calibrate the load measurement apparatus to confirm accuracy to within ±50 N (±11 lb).

8.12.4 *Procedure*—Determine whether the sample is designed for consumer or institutional use. Obtain and record from the manufacturer the maximum load rating that they specify for the machine or bench, the maximum user weight that the bench is designed for (if less than 135 kg (300 lb)) and the maximum load that it is intended to support during use. Determine, through consultation with the manufacturer, the usage direction and how the user is supported on the machine and the approximate percent of the user's body weight that the machine experiences during use. Perform the calculation for the equation specified in Specification F3105 to determine the load to be applied. Determine, through discussions with the manufacturer, where and in which direction the maximum load is applied to the machine or bench (that is, point of shoulder contact for an Olympic bench press or seat pad for a vertical shoulder press). Secure and support the load application device to this point on the machine. The load is to be applied in the direction of user applied loading through a plate at this point with dimensions of 305 mm (12 in.) square. Apply the load to the machine and maintain this load for 5 min.

8.12.5 *Pass/Fail Criteria*—If the machine or bench fails to support the load for 5 min or if it fails structurally then the machine or bench shall fail the test. The maximum load rating for the bench shall be no more than the percentage of the user's body weight supported plus the maximum load experienced during usage of the machine.

8.12.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.11 for verifying the load rating of a machine or bench since the test result is non-quantitative.

8.13 *Documentation and Warnings:*

8.13.1 This test is a confirmation that the documentation and warnings accompanying and affixed to the sample meet the requirements set forth in Specifications F3105 and F1749.

8.13.2 *Apparatus and Set Up*—The sample shall be set up as described in 7.1. Obtain all documentation for the sample from the manufacturer.

8.13.3 *Calibration*—No calibration is required. This is a visual test only.

8.13.4 *Procedure*—Examine the documentation provided with the sample. Verify that the documentation conforms to Specification F3105. Examine each of the warning labels affixed to the sample. Verify that the labels conform to Specification F1749.

8.13.5 *Pass/Fail Criteria*—Documentation must conform to requirements of Specification F3105.

8.13.6 *Precision and Bias*—No information is presented about either the precision or bias of test in 8.12 for documentation and warnings compliance since the test result is non-quantitative.

9. Report

9.1 *Record of Tests*—Maintain complete test records and test summary reports for all testing, whether performed by the manufacturer or an independent laboratory. The records can be stored on paper, electronically, and/or on photographs. A copy of the test summary must be kept by the laboratory that performed the test for a minimum of five years from the date of the test and by the manufacturer for a minimum of five years past the end of production of the model tested. The summary shall include the signature of the technician(s) performing the tests and a management representative of the laboratory performing the test. The test summary shall include the following information:

9.1.1 Manufacturer's name and location.

9.1.2 Information provided by the manufacturer to accurately identify the configuration of, and specific unit provided to, the testing agency.

9.1.3 Dates over which the tests were conducted.

9.1.4 Name and location of the testing laboratory, if different from the manufacturer.

9.1.5 Summary and results of each test performed including method and apparatus used. This shall include what the desired requirement was and whether the test sample met that parameter or failed. If the test requires a specific number of cycles to be met, then the report must include the number of cycles actually conducted. If the sample fails to meet a parameter, then that failure must be noted in clear and accurate terms to enable a reader of the report to understand at a later date what transpired.

10. Keywords

10.1 fitness; free weight equipment; Olympic bench; plate loaded fitness equipment