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The Equipment and Facilities Specifications Newsletter

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WELCOME TO NEW SUBSCRIBERS

This Newsletter is a semi-annual educational tool for Implement Inspectors, Technical Managers, interested Throws Officials, and certification chairs. Input and suggestions are always welcome. This copy is being sent to about **875** officials around the world. We welcome our new subscribers with this issue:

Last Name	First Name	Association
Luebbering	Greg	Litania Sports Group
Shenck	Dan	Litania Sports Group

If you know someone who could benefit by getting this information, please send his or her address or e-mail address to the editor. Likewise, if you are no longer interested in being on our mailing list, also let me know. For faster delivery, and for updates in between newsletters, send me your e-mail address. If you're getting this by US mail, I don't have your current e-mail address.

CHAIRMAN'S CORNER

JAVELIN

There will be a new implement introduced to the Rules Committee this year. It is hoped to use this as a progression for the Youth Committee to fit between the Mini Javelin and the regular javelin. This javelin is all plastic, although some can come with a regular cord grip instead of a plastic replica of one. The weight is between that of the regular javelin and the Mini Javelin.

At our meeting this year, we will have some samples to take a look at. While I can't find a web page with good pictures of this javelin, this page http://www.pocketvideos.com/javelin/finnjav/ will give you an idea of what it looks like and what it can do. For video of this javelin in use see http://www.pocketvideos.com/ . This will compare the throwing motion between the Finn Jav and an 800 gram javelin.

The proposal will be to use this javelin (called the Aero Jav in the rules proposal) for the 11-12 and 13-14 age groups with the younger athletes throwing the Mini Jav that they already throw. This would allow a progression to the pointed javelin using implements that are safe for the younger athletes.

HAMMER

Ivars and I have been having a discussion on the hammer lately. He looked at the rule, which specifies the hammer head "must be spherical in shape and smooth." I will let him give you his take on this elsewhere in this newsletter. I contend that there is no advantage to be gained from a hammer head that is dented. In fact a dented head should create more drag and therefore is a disadvantage to the athlete.

The question then becomes how much can a hammer differ from a sphere and still be a legal hammer. Obviously a head that is cubical is not going to fly so there must be something in between where we have to draw the line. The problem is that hammers take a beating on some landing surfaces. They don't all land on grass so some minor damage is to be expected. If the head is damaged so much that the shell is cracked, it should be disallowed. One dent that does not cause a crack should not be a problem, in my opinion.

If we have the time at our meeting this year in Anaheim, I intend to open the subject for discussion. I know that many of the readers of this newsletter will not be at the meeting, so I encourage those who will not be in attendance to let Ivars and me know what your thoughts are. Our email addresses are listed here in the newsletter.

Anyone receiving this newsletter is welcome to help put it out by submitting articles. These articles need to relate to the subject of the committee. Any problems that come up may be sent to us as well. Keep us informed as to what is happening out there.

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E&FSS ANNUAL MEETING

The subcommittee annual meeting will be held on Tuesday, Dec. 2nd at 4:50 PM in Anaheim, CA. The minutes from the 2013 EFSS annual meeting are located at:
http://home.comcast.net/~ikstrums/2013_EFSS_meeting_minutes.pdf

RULE CHANGES AFFECTING EQUIPMENT OR FACILITIES

The 2015 **NFHS** high school rules changes have been announced. The following equipment & facilities summary of changes is based on the NFHS press release:

6-2-17 NOTE, 6-6-9, 7-2-18 NOTE 1: Allows for an additional trial when an implement breaks and becomes non-compliant during competition due to no fault of the competitor. This rule previously only concerned the javelin, but now is expanded to include all the throws implements. Reorganizes and places the rule within general rules for throwing and jumping events.

8-2-1f: This is a new rule that allows the inclusion of the weight throw in indoor meets

The NFHS press release can be found at: http://www.nfhs.org/sports-resource-content/track-and-field-rules-changes-2015/

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The 2015-16 NCAA rules change package is available at:

http://www.ncaa.org/sites/default/files/2015_2016_Track_Field_Cross_Country_Rules_Changes.pdf

also available at:

https://my.usatfofficials.com/resources/2015-ncaa-rule-changes/download/377

Equipment & facilities changes are described for Rules 1.1.1.a, 1.1.2, 1.1.3, 1.1.7 (track facility); 2.10.3 (hammer handle); 5.1.2 (method of starting); 8.2.2 (x-country course)

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The following **USATF** rules change proposals, as regards equipment & facilities specifications, have been made for consideration at the annual meeting in Anaheim:

Item 5 (Tabled 2013 Item 64): Amends Rule 181.18 by specifying in more detail the pegs which hold the cross bar for the PV and HJ events.

Item 6 (Tabled 2013 Item 66): Amends Rule 181.20 by redefining the dimensions and configuration of the PV and HJ pits.

Item 36: Amends Rule 162.5.b to define "suitable loudness" for electronic start devices.

Item 49: Revises Rule 181.18 by requiring the use of a pole vault box collar for all USATF-sanctioned events.

Item 54: Amends Rule 187.7.b by changing the measurement of a javelin landing to the point where the head strikes the ground, rather than where the tip strikes the ground (IAAF compliance).

Item 55: Amends Rule 187.10 by limiting the number of personal throwing implements submitted for inspection to four per competitor per event.

Item 56: Adds new Rule 193.11 which creates a new type and configuration of javelin, to be known as the Aero Javelin. This change is paired with Item 81.

Items 60 & 61: Refines Rules 242.7 & 244.4 with respect to transponder timing equipment.

Item 81: Amends Rule 301 by specifying the use of the Aero Javelin by the Youth 11-12 and 13-14 Groups. This change is paired with Item 56.

EQUIPMENT CORNER

If you have any information on equipment that you have purchased or built to help with your weight and measures or technical managers' activities, please pass along the information. One of our goals is to disseminate this type of information.

Fractional performance board

Performance boards in the field events are common equipment. The most versatile are the electronic performance boards which can display both metric and English measurements, along with the athlete's bib number. However, the manually-set boards are far less expensive, and therefore more common in high school equipment inventories.

The manual boards have a shortcoming in high school use, though: The horizontal jumps and the short throws are measured to a quarter inch, but the boards only display to the whole inch. It is common practice to truncate the fraction on these boards.

For anyone interested in displaying the full measured distance, here is a simple and inexpensive device that can be clamped to a performance board.

First, three cards are printed and laminated with ¼, ½ and ¾ written on them. A fourth card is deliberately blank.

The cards are attached to a rod with two loose-leaf rings (also known as book rings). The rod has a large washer on one end to keep the cards from sliding off. On the other end, the rod (aluminum in this case) is tack-welded to a piece of aluminum stock, which is rectangular in shape.

The rectangular stock is fitted to the performance board and secured in place with small c-clamps.

This particular design is intended for temporary attachment to the performance board.

Course measurement with GPS

While the following subject is not part of the responsibility of this committee, we thought this might be interesting to our subscribers.

Can a consumer-grade GPS receiver be used to measure the length of a road race or trail race course, as opposed to using the more traditional wheel?

Arguments in favor of this approach include the fairly good accuracy attainable when the receiver has a good "view" of several GPS satellites and the wide-area augmentation satellites. But a few issues need to be addressed before seriously considering this method.

Let's start with an extreme example of where GPS absolutely would not be useful: trail racing in heavily-wooded areas. The editor recently had the opportunity to do some hiking in the North Cascade Mountains of Washington State, near Bellingham. A test was carried out using two identical Garmin model 62 GPS receivers on a trail that looped around a small lake. The trail was sufficiently offset from the lake that it had heavy tree cover all around. Additionally, a low nearby mountain ridge helped obscure some of the satellites. In all, this was a challenging scenario for a GPS receiver, although it typified many trail race courses found in the Pacific Northwest.

The editor had his receiver hung around the neck from a lanyard; it remained in a vertical orientation and was partially shielded by the body during the hike. The editor's daughter hand-carried the other receiver, holding it in a near-horizontal orientation in front of her. Both units were zeroed at a waypoint before going around the lake. The receivers were set to calculate distance in real time as they progressed around the lake. The results:

GPS	perimeter distance
#1 (vertical)	0.74 mi
#2 (horizontal)	0.81 mi

This one measurement is hardly conclusive. To be complete, several more loops around the lake would have been necessary, changing the receiver positions and orientations to determine whether the observed difference was due to how it was held, the individual units themselves or other factors. However, the 10% difference between the two units in this example should cast doubt on their ability to accurately measure distance while continuously moving in a wooded area. Clearly, the wheel (or a calibrated bicycle) is the better solution.

Would a GPS receiver be useful for course measurement out in the open, where trees and buildings do not provide interference? This is a difficult question. The editor has no direct experience with GPS measuring distance under such conditions. Readers are invited to send in any such test results they might have. However, in general, anyone wanting to make such measurements with GPS would first need to demonstrate over a known course the accuracy of the receiver. By the time that was completed, a course measurement using a wheel or bicycle would probably already be complete.

Bob Springer conducted a different experiment using Garmin 60c & 64st models. He reports the following:

> I put the 64st in the window at 9:07 PM and left it in place. I closed out at 10:44 AM this morning and it showed 0.27 miles of travel. The 60c was put out at 11:20 PM and stopped at 10:44 AM. It showed only 97 feet of movement. The 64st has much better software, but showed much more movement.

A GPS receiver is continually updating its position. It does not have a way of knowing if it is physically moving other than its calculated positions. Its distance calculator apparently sums all movement, rather than net movement.

THE TRAINING CENTER

This is a regular feature of this newsletter, where we discuss the method of measuring an implement, venue or a track facility. Your comments or areas of interest are welcome. It is through this kind of dialogue that we learn from each other and improve our skills. Send the editor your stories and questions.

CG of indoor weights

The USATF rule that defines the throwing weight was rewritten not too long ago. One area that received much attention, but was not revised, was the center of gravity specification of the indoor weight. The spec is simple enough: ± 9 mm from the center of the head. But achieving and measuring that is not so simple. The size of the void in the head, and stratification of the fill material, are two factors that confound this issue.

In an attempt to quantify whether the CG spec of the indoor weight really is a problem, the editor tried to construct a measuring tool. An 18 mm ID orifice, analogous to how the hammer head's CG is measured, was the best bet. After some searching, two different metric pipes of 18 mm inner diameter were found, one of thick wall construction, the other thin wall. After some experimentation, the thick wall pipe appeared to assist the head in staying balanced, so the thin wall pipe was used for further measurements.

A short piece of this pipe was cut, less than an inch long. A metal plate was used as a base. It soon became very apparent that leveling this tool was very important, more so than for hammer measurements. This was accomplished by shimming the metal plate.

Measurements of weight heads were performed during the last indoor meet of last season where time allowed, or the weight needed to be disassembled anyway.

Two types of measurements were made:

- The heads were gently shaken back and forth, to level the fill material in the void. This was done at several rotation angles. These were dubbed the "level" measurements.
- The head was then rolled to get the fill material "bunched up" on one side of the void. These were dubbed the "rolled" measurements.

Multiple measurements were made on most of the heads, and a single Pass/Fail notation was made to simplify the results. The measured heads were a mixture of old and new equipment, representing the major brands.

20 lb heads
Number measured: 10
that passed the "level" measurement: 9
that passed the "rolled" measurement: 8
Note: 2 of the 3 failures (both "level" and "rolled") came from a single visibly old and worn weight.

35 lb heads
Number measured: 9
that passed the "level" measurement: 5*
that passed the "rolled" measurement: 3*
*Note: one head, not included in this tally, was apparently heavily stratified because it passed some of each measurement at a few rotation angles, and failed the rest.

These results should be treated as preliminary. The editor intends to refine the test fixture (that is, making it easier to level), and make more measurements during the coming indoor season.

Hammer heads

Bob mentioned an ongoing discussion about hammer heads in the opening of this newsletter. Specifically, how many dents (and how large) can a hammer head have before it is disqualified from competition? And, along the same line, should we look at surface smoothness of the head also?

Two issues come to mind: (a) how to interpret the rules in this context, and (b) aerodynamic aspects, if any. Let's start with the easier matter:

a. **Hammer rules**. IAAF Rule 191.5 dictates that the head must be a sphere, but says nothing about smoothness, texture or dents.

USATF Rule 191.5 states that the head "…must be spherical in shape and smooth."

NCAA Rule 2-10-1 requires the head to be a sphere, but, similar to the IAAF, says nothing about the surface condition of the head.

At this time USATF stands alone, requiring a smooth hammer head surface. But "smooth" is not defined, and, therefore, can be very subjective. What if the head has many dents, but the dents themselves are smooth? Does that still pass? What if one spot on the head is heavily scratched or abraded – is that disqualifying? Or should the scratches cover a significant portion of the head before it is deemed to not be smooth? Should light scratches and heavy abrasion be considered equivalent when interpreting the smoothness clause?

The above scenarios and questions do not have easy answers. Yet they represent situations that Inspectors can encounter on a regular basis.

But the above is only part of the discussion. All the rule books require the head to be spherical. How should this be interpreted? Notionally, this means the head must pass the min/max diameter check using ring gauges or calipers, and not display any signs of being oval or oblong.

But how is the "spherical" requirement interpreted when dents are introduced? From a purist's perspective, a dented sphere is no longer a sphere because its diameter is no longer constant at all points. Realistically, however, all hammers will accumulate some measure of dents over their lifetime. At what point is a dented head no longer a sphere and must be disqualified? Should that ruling be a function of the number of dents, the size of the dents, or both? In a way, this is similar to the smoothness discussion because "spherical" is not well defined.

One extreme solution is this: Allow all hammer heads, regardless of the number/size of dents, and the amount of surface abrasion, as long as the head is not cracked, passes the min/max diameter check using ring gauges, and passes the CG check (the latter might be sporty with a heavily dented head, but it can be done). The natural counterpoint to this argument would be that while the letter of the rule is not succinctly defined (what is smooth? what is spherical?), the spirit of the rule is violated with a heavily dented and abraded head.

Conversely, if the rule is revised and the concepts of "smooth" and "spherical" are more objectively defined, the Inspector's job would be easier. It would, however, require more diligence from the event judge, since every hammer that gets thrown into a cage post would need more attention to ensure it does not violate the revised rule.

The intent of this tome is not to present a definitive solution. Rather, this is to set the stage for an EFSS committee discussion. One possible outcome is a set of guidelines that are published in the Implement Inspector's Handbook. Another possibility is to recommend changing USATF Rule 191.5, although this should not be done without first understanding the context of why it is written in its current form.

With that, it is time for the second consideration. While this may seem a bit outlandish to some, please read on. I've done some research of literature and found an interesting argument. While the magnitude of this effect may or may not be significant to the flight of a hammer without some serious experimentation, it deserves at least some attention:

b. **Aerodynamics**. After writing and rewriting this section, I decided to publish a watered-down version because this is not an aerodynamics newsletter. However, anyone who wishes to read the longer version can receive it by sending a request to the editor at the email provided on Page 1.

In summary, the following apply:

- When a smooth sphere travels fast enough thru the air, it develops a *wake* behind it. Think of a wake as a pocket of vacuum behind the sphere. This contributes significantly to the sphere's overall *drag.*
- If dimples, dents or other discontinuities are added to the sphere, some extra drag is created due to air *friction*. However, at the same time, the air becomes turbulent around the sphere, which reduces the size of the wake. The overall effect is the net *reduction* of drag. This is one of the two reasons why dimpled golf balls fly farther than smooth golf balls.

Can a dented hammer head derive similar benefits as does a dimpled golf ball? I will be careful here. In theory, yes.

I will argue that *wake reduction* might happen with a heavily-dented hammer head; the only question is how much of an effect will that have on the distance of the throw. The only way to definitively determine the answer would be to conduct wind tunnel tests with hammers (anyone know a wind tunnel facility that will give USATF a discount?).

If my argument is true, then the elite athletes will benefit the most from dented hammer heads. This, then, begs the logical question: What would you do as an Inspector at a high-level meet where personal implements are allowed and an elite athlete brings a heavily-dented head? Pass it? Disqualify it? On what grounds?

I will acknowledge that this may actually be a moot point. After all, we don't worry about wind during a discus event, so why worry about the aerodynamic drag of a hammer?

DOCUMENT LINKS

The Implement Inspector's Handbook is available at the bottom of this link:
http://www.usatf.org/groups/officials/resources/field-events/

The Implement Specifications Best Practice has been updated for the revised Youth group designations and is available at:
http://www.usatf.org/groups/officials/resources/best-practices/

Past **EFSS newsletters** are located at:
http://www.usatf.org/groups/officials/newsletters/