



# The Equipment and Facilities Specifications Newsletter

An official copyrighted publication of the Equipment and Facilities Specifications Subcommittee  
of the National Officials Committee in its 28th year of publication

## 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 **900** officials around the world. We welcome our new subscribers with this issue:

Last Name	First Name	Association
Anderson	Michael	
Barrios	Elena	Spain / IAAF ITO
Cornelius	Lloyd	New York
Edwards	Sandra	New York
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Mata	Patty	Nebraska
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Rowland	Vicki	Kentucky
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Smyth	Jim	North Carolina
Weinhandl	Rich	Tennessee
Wilson	John	Three Rivers
Wyrick Carrington	Cindy	North Carolina

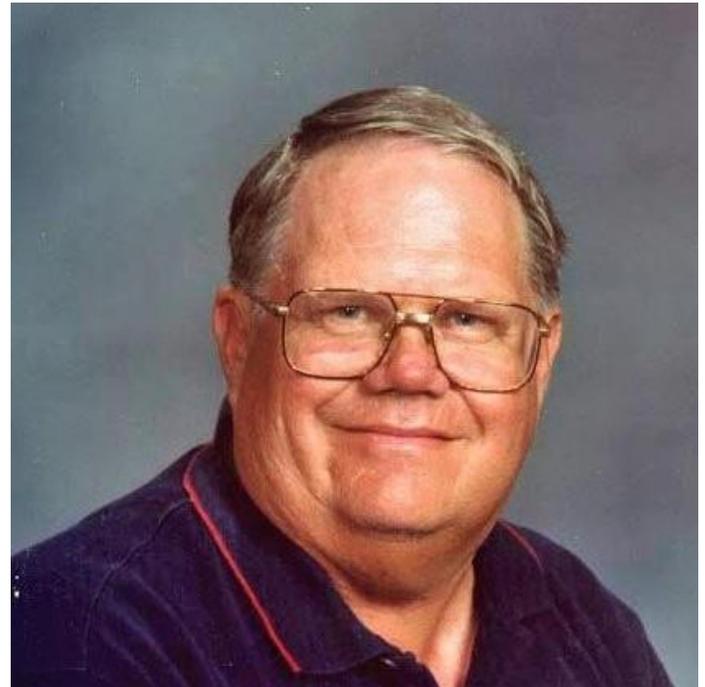
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## CHAIRMAN'S CORNER

Rest in Peace George Kleeman

I don't remember when I met George. I do remember meeting him at a meet in Seattle in the late 90s when Washington was hosting the Pac-10 meet at Husky Stadium, but I know I knew him before that.

We worked together on many meets, either in Sacramento or at tracks around the world doing World Masters meets. For the 2000 Olympic Trials at Sacramento he started what is now the Technical Manager. I was not selected as a competition official, which is not too surprising since I had only started doing national level meets outside Seattle in 1998. George had other ideas. He asked me to come to Sacramento to head up what he was calling the Field Crew. Our job was to set up the field for every field event. That job eventually became the Technical Manager we know today.



George had started the Equipment and Facilities Specifications Subcommittee of the NOC and was putting out a newsletter twice a year. Sometime around 2007 or so, George asked me if I wanted to take over the committee. I could not imagine doing the newsletter anywhere close to how George was doing it so I declined.

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When I convinced Ivars to do the newsletter, I told George about that and he was most happy to turn over the reins to me with Ivars as newsletter editor.

There is a rule in the USATF rules that is

credited to George, or was at the time. That would be Rule 187.15. I was sort of involved in that one. I was working the field in the discus at Stanford for the Pac-10 meet. We were in warmups for the finals of the women's discus. I was watching the implements fly in and then helping retrieve them. I saw one come in and take a strange bounce and hit me in the ankle. I was not seriously injured and worked the rest of the event. Later that year, George was working the field at the USATF Nationals in New Orleans. A similar thing happened, but this was on an artificial surface and the discus did not slow down as it would on grass. George was hit and broke his leg. That led to the rule requiring natural surfaces.

I learned so much from George and I know I was not alone in that. He was a mentor to many officials. He will be sorely missed.

This column was written on the evening of April 22, 2018, the day that George passed away.

### E&FSS ANNUAL MEETING

The subcommittee annual meeting will be held on Thursday, Nov. 29th at 3 PM in Columbus, OH.

The proposed meeting agenda is:

#### Introductions

#### Approval of 2017 Meeting Minutes

#### Agenda Review and Approval

#### Old Business

- Status of Action Items/Goals for 2018
- Implement Problems/Reports in 2018

#### New Business

- Rules Changes for 2019
- Newsletter concern
- Goals for 2019
- Action Items for 2019
- Review of Implements Presented 2018

### RULE CHANGES AFFECTING EQUIPMENT OR FACILITIES

The following USATF rules change proposals, as regards equipment & facilities specifications, will be considered during the annual meeting in Columbus, OH:

**Item 8, Rule 164.4**, Finish lines for events finishing outside the stadium: Changes the finish line width wording from "may be up to 30 cm in width" to "shall be 5 cm to 30 cm in

width" for IAAF conformity. The same change applies to companion Rule 244.1 (Item 27) and Rule 256.2 (Item 28).

**Item 19, Rule 189.3:** Changes the maximum allowable diameter of the 1 kg discus from 182 mm to 202 mm to match the max diameter dimension of the 1.5 kg discus.

Editor's note: While this rule change is intended to accommodate men who have progressed into the M60+ age groups, it does not say if Masters Women (W70 and less), Open Women and Youth are allowed to throw the larger diameter 1 kg discus.

**Item 20, Rule 195.7(b):** Adds clarifying words about how the throwing weight's handle is attached to the head. [WMA conformance]

**Item 21, Rule 195.9:** The indoor throwing weights are allowed a maximum head size that is 15 mm larger in diameter than the corresponding outdoor weights, but this rules change rescinds that oversize allowance for the 4 kg indoor weight.

**Item 22:** Adds new Rule 195.10 which (1) allows the use of the outdoor weight for indoor or outdoor competition, depending on the throwing surface, (2) allows the use of the indoor weight for indoor competition only, and (3) disallows the use of both types of weights in the same competition. [WMA compliance]

**Item 36, Rule 264.1:** Adds the specific requirement that throwing implements used for Masters records must comply with *WMA specifications*.

Editor's note: While notable strides have been made in recent years to harmonize the USATF Master rules and WMA rules for the throwing implements, there are still some technical differences. In almost all cases, the WMA rules are less stringent. If adopted, this rules change would require, in a meet governed by USATF Masters rules, an implement to comply with WMA rules on the occasion of an American record throw. Also see Items 78 and 93.

**Item 37, Rule 301:** Adds the 750 g discus to Youth competition for use by the Boys and Girls 9-10 year age division.

**Item 41, Rule 302:** Expands the definition of hurdle layout for Youth indoor competition, and adds a new rule specifying the shuttle hurdle exchange zone.

**Item 78:** All Masters championships will use throwing implement specifications that comply with WMA rules.

Editor's note: Similar to the note for Item 36. Much effort has been spent in recent years tuning the USATF Masters implement specifications. In some cases, this rule change will invalidate the USATF Masters specifications rules.

**Item 91, Rule 332.3(f):** The loss-of-identity rule for Masters implements is clarified. [WMA conformance]

**Item 93, Rule 332.3(g):** (1) The callout for the WMA throwing implement table is changed from “specifications” to “weights” to match the actual content of the table.

(2) New rule 332.3(h) is added that states, “WMA specifications are in the individual implement specification tables,” and identifies the specific paragraph numbers.

Editor’s note: While this is being done for purposes of WMA compliance, it will also create confusion and rule conflicts. There are still some differences in the technical specifications of USATF Masters implements and WMA implements. The difference must be resolved before this rule change can be adopted.

**Item 94, Rule 332.3 (h):** The definition of, and use of, Masters take-off boards and take-off lines is expanded. [WMA conformance]

**Editorial changes:** The minimum thickness of the 1 kg discus is changed back to 37 mm.

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NFHS rules changes for 2019 high school T&F can be found at:

<https://www.nfhs.org/sports-resource-content/track-field-and-cross-country-rules-changes-2019/>

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The NCAA 2019-2020 rules changes are detailed at:

<http://www.ncaa.org/sites/default/files/2019-20MWTFRulesChanges2019and2020FINAL20180816.pdf>

The NCAA 2019-2020 rule book can be purchased and/or downloaded at:

<http://www.ncaapublications.com/p-4564-2019-2020-cross-country-and-track-and-field-rules.aspx>

Of note are three rules changes:

- Cone placement for indoor T&F has been changed from 1.5 meters to 4 meters.
- The relay zone rule has been revised.
- Beginning January 1, 2021, all newly constructed or resurfaced outdoor tracks shall be surveyed for a curb and shall have a regulation curb in place for competition.

## 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.

### Shot diameter/circumference

Many officials use machined or laser-cut templates to measure shot and hammer head diameters. But a set of templates can set you back a number of dollars. Dan Moy provides a more economical alternative:

*I have devised a very simple piece of equipment that will allow any track and field official to determine if a shot is too large in circumference. It is agreed that an overweight may be used, but not an over-sized shot.*

*I borrowed my wife's plastic measuring tape that is calibrated in both english and metric measures. With different colored marking pens I then marked on the tape the MAXIMUM CIRCUMFERENCES for any and all shots that I might need to inspect. I then cut the measuring tape about 22 inches which is longer than the circumference of a 16 lb ( 7.26 kg) indoor shot of 455 mm. Loop the zero end of the tape to the circumference and hook the loop with a paper clip. You may cut it shorter for high school equipment.*

*The circumference of all shots may be calculated by the formula:*

$$C = \pi ( 3.14 ) \times d ( \text{diameter} )$$

*Most all rule books have the diameter printed in them.*

*(I would suggest that you use metric units, since they do not involve fractions. The English measure should be on the back of the tape.)*

*In many high school meets that I officiate as the only registered official I ask the athlete to place the shot in the palm of their hand. I place my "official loop" on or around the shot to check for the circumference.*

*If is too large, that shot should be impounded until the meet has been completed. I found three (3) 8.0 lb. shots being used in a girls competition when I noted that my "official loop" passed over the shot too easily.*

*As a track and field official you may have to make a decision if the "official loop" is too tight when the shot is measured. Is the shot dirty, odd shaped, etc.*

*(Also, don't forget to purchase a new measuring tape for your wife),*

*Best of Luck in our Sport,*

*Dan Moy  
USATF official  
Jacksonville,  
Illinois*

### More DISTO correspondence

The following was received from Dimitri Georges:

*I use a 7500 A LOT, and find the instrument to be incredibly accurate. I calibrate on an ongoing basis during a competition (between flights and events), against a*

*certified steel tape, and find the Disto to be completely accurate. I like using the legs against the back of the circle. For horizontals, we set back tape perpendicular to the runway @ 20 m and use the offset feature. Leaves the pit clean and uncluttered.*

*I agree with you that the Distos can easily be misused as well. I've seen some stuff go on by sloppy operators that have made my skin crawl. Biggest issue is the misuse of the target board by officials that have no idea of the importance of the bubble.*

*I'm moving to an S910 this year because I can't keep moving in and out of the cage or runway (due to my arthritic legs). The point to point function on the S910 allows you to use it just like a total station (except that the S910 will automatically calculate the offset and give you a true measurement; unlike the total stations).*

*Thanks again.*

### Summary of implement reports.

Bob Springer has compiled the implement inspection reports that have been sent to him during the 2018 seasons. Both the data table and his summary are attached to the end of this newsletter.

## 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.

### Indoor weight fasteners

The indoor season is just around the corner. One of the most important functions an Implement Inspector can perform at an indoor meet is check the tightness of the fasteners on the swivel. My colleagues and I usually track the number of fasteners that needed tightening, and also the number that needed more than one turn. The results can be sobering: During the first meet of the year, usually more than 50% of the weight fasteners need tightening, and several need anywhere between one to four turns before they are tight. Anything that loose is getting ready to come apart during a throw. You are doing the athletes a real favor by taking care of this problem, but you will do them a greater favor if you have the ability to show them how loose those fasteners are.

### Inspecting the indoor weight

This topic has not been covered in a while. Given the rules changes in the last few years, it's time to revisit the subject.

The NCAA, USATF and WMA each have their own rules that govern the configuration of this implement; the IAAF does not use the throwing weight. NFHS allows the indoor weight throw as a special event. Furthermore, this implement has both indoor and outdoor variants, with their attending specifications. Inspection of the throwing weight can be grouped into the following areas:

- Construction
- Weight
- Dimensions
- Other considerations

### A. Construction

The weight consists of a head (ball), handle, connection, and (in the case of an indoor weight) a harness.

#### A.1 The Head

The **outdoor** (or "all-metal") head must be a sphere, not softer than brass, with no detectable internal movement. All rule books require the center of gravity to be no more than 9 mm from the center of the sphere.

Ensure the swivel plug in an outdoor weight head is tight.

The **indoor** (or "filled") head must be a sphere made of plastic or other suitable polymer material. It may be filled with lead or other material in such a manner that *minimizes* any internal void or internal movement (NCAA & USATF rules), or does not allow internal movement (WMA rules). In all cases, the 9 mm center of gravity specification applies. It is a partly subjective call on the part of the Inspector as to what constitutes a minimal internal void (a 1 inch deep void is acceptable, but can't be directly measured).

All rule books allow the indoor head to deform slightly upon impact, but it must return to the shape of a sphere immediately afterwards. The latter requirement disqualifies any heads made of rubber or other material that allow flat spots to remain after an impact. In fact, the NCAA & USATF rules specifically disallow rubber as the shell material for an indoor weight, but WMA does allow it.

Check all weight heads for flat spots, dents or cracks. Check indoor weight heads around the fill hole for cracks or a protruding fill plug. All such conditions are grounds for disqualification. Sometimes small hairline cracks will be seen around the fill plug. How do deal with these is a judgment call. At a minimum, inform the athlete or coach of this condition. These cracks are not repairable and will grow over time. If these cracks are small and do not appear to be an immediate problem, place athletic or duct tape over the area for good measure.



The head at left is made of a rubber shell and has a pronounced flat spot. Both conditions are cause for disqualification. The head at right also has a noticeable flat spot; this extends its center of gravity unfairly – it should also be disqualified.

**A.2 The Handle**

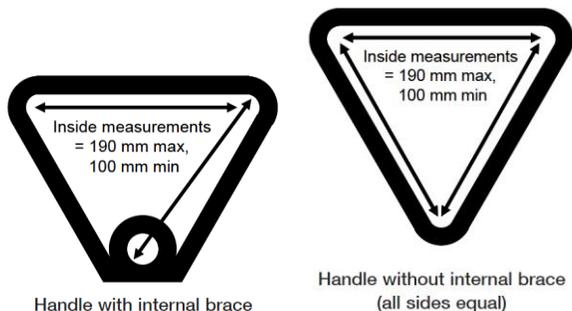
Handle specifications vary by rule book and whether the handle is attached to an indoor or outdoor weight.

NCAA and USATF require a triangular handle made of steel rod, but do not specify any maximum or minimum rod diameter. Furthermore, the handle must not display any signs of elasticity or malformation before, during and after competition. Hammer handles may not be used under NCAA and USATF rules.

Under WMA rules, the outdoor weight handle has a relaxed definition which allows the use of hammer handles.

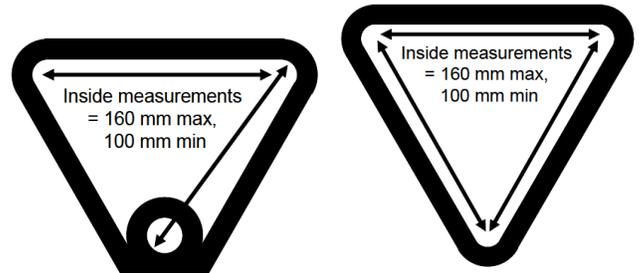
However, the WMA indoor weight allows the use of a hammer handle or handle is very similar to the NCAA handle, except the metal rod diameter may not exceed 12.7 mm diameter (~1/2 inch).

**NCAA handle dimensions:** No side of the triangle may be greater than 19 cm (inside measurement), nor less than 10 cm (inside measurement). Furthermore, an indoor weight may only have a handle with a permanent attachment point. A handle with no permanent attachment point may only be used on an outdoor (all-metal) weight, and its sides must all be of equal length.



(indoor or outdoor weight) (outdoor weight only)

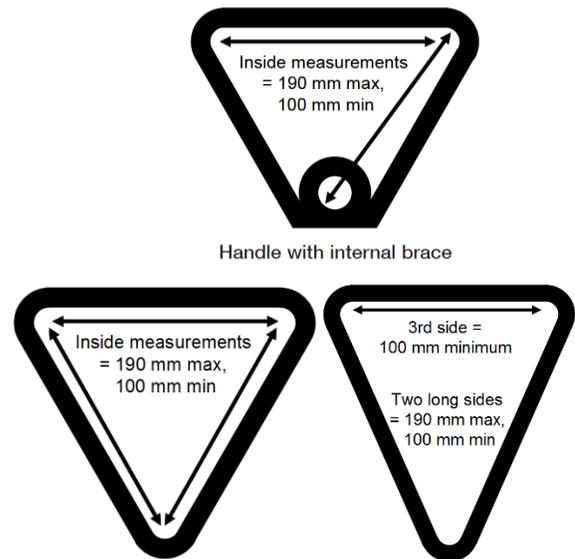
**USATF indoor handle dimensions:** No side of the triangle may be greater than 160 mm (inside measurement), nor less than 100 mm (inside measurement). A handle with no permanent connection point must have all sides of equal length.



Handle with internal brace

Handle without internal brace (all sides must be equal)

**USATF outdoor handle dimensions:** No side of the triangle may be greater than 190 mm (inside measurement), nor less than 100 mm (inside measurement). As of 2015, a handle with no permanent connection point shall be constructed in such a manner that regardless of how the handle is turned, the length of the implement does not exceed the specified maximum length of the implement.



Handle with no internal brace: Must be oriented such that the implement is at its maximum length when the length measurement is performed.

**WMA indoor handle dimensions:** The handle may be a hammer handle or made triangular rod. In the case of the latter, no side of the triangle may be greater than 190 mm (inside measurement), nor less than 100 mm (inside

measurement). A handle with no permanent connection point must have all sides of equal length.

**WMA outdoor handle dimensions:** Dimensions are not specified.

### A.3 The Connection Assembly

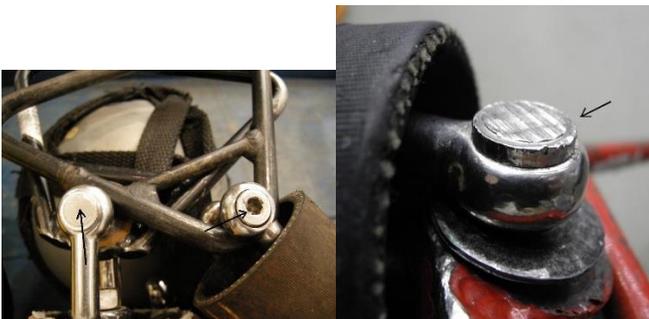
For an outdoor weight, the handle is connected to the head by no more than two steel links (USATF), by one or two steel links (NCAA), and by any number of links per WMA rules. The links must be robust enough to not stretch while thrown. The handle is connected to the links without use of a swivel, but a swivel is optional where the links are attached to the head. Frequently threaded connectors (“quick links”), pictured below, are used as one of the attachment links. The nuts on these links should always be checked for tightness.



For an indoor weight, with or without a harness, NCAA requires a swivel and no links. USATF, at a minimum, requires a link or swivel, and if both are used, the swivel must be attached to the head. WMA requires a harness, and up to two metal links with an optional swivel. A protective sleeve may be placed around the links or swivel.

Inspect the links and/or swivel. Look for pitting corrosion, necking or other signs of damage or yielding by these components. If their integrity is in doubt, impound the implement.

CHECK the fasteners on the swivels, both top and bottom, and tighten when necessary. Experience has shown that such fasteners regularly come loose during throwing. This will require English and metric hex wrenches, needle-nose locking pliers, and one slotted screwdriver (preferably two screwdrivers of different sizes). Adding Loctite or a plumber’s compound to the fastener threads is a plus, but use a small amount; otherwise the fastener might be nearly impossible to remove in the future.



The middle fastener, above, is a socket cap screw which requires a hex wrench to tighten it. The other two fasteners are seen with some regularity; they have no features to accept a wrench or screwdriver – locking pliers work best for tightening these.

This fastener, pictured at right, has backed out a couple of turns – it is an accident waiting to happen. But all indoor weight fasteners should be checked for tightness, whether or not they appear loose.



Inspect the protective sleeve, if present. In particular look for a damaged sleeve that might rip open and separate from the implement. If in doubt, wrap the sleeve with plenty of athletic or duct tape.

### A.4 The Harness

The harness is a common method of attaching a filled (indoor) head to the handle via the connection assembly. When used, it must be made of a minimum of four straps that are sewn together to form a sling. The harness may not stretch or show evidence of elasticity before, during and after the competition. As such, netting cannot be used as a harness material.

With sufficient use, a harness can become abraded, start fraying and its stitching can come undone. Therefore, a visual inspection of the harness is required. If a harness is coming apart, the implement should be impounded. In particular, check the locations where the harness straps are attached to the metal hardware. Some designs are less robust than others.

### B. Weight

The nominal weights are 4 kg, 12 lb, 16 lb, 20 lb, 25 lb, 35 lb, 20 kg and 56 lb. These cover the full slate of Collegiate, Open and Masters competition. The values listed in pounds are nominal; see the rule books for the exact values in kilograms.

The NFHS allows the indoor weight throw as a high school special event (NFHS Rule 8-2-1) and advises that USATF Youth rules be used. Effective 2017, USATF Youth rules now include the 25 lb weight for Boys and the 20 lb weight for Girls.

Check the weight. This is most easily done by placing the handle on the scale and putting the head in the handle so it doesn’t roll.

For indoor weights that include a harness, some athletes will tape quarters or large washers onto the head to help them make weight. As the head rotates within the harness during successive throws, the quarters will rip free and detach. The Inspector should be aware of this type of hobby-shop repair.



The top two pictures show two indoor weights that were received with taped coins inserted in the harnesses to make minimum weight. This is not legal. The third picture is of a taped packet of lead pellets that was found inside of a different harness.

A more proper repair is adding washers to the connecting harness upper clevis pin (at the handle connection) as shown below. Avoid adding washers to the lower clevis pin since that can abrade the harness straps.



### C. Dimensions

Check the length of the weight. The length is measured from the inside surface of the **middle** of the handle to the bottom of the complete implement (NCAA & USATF rules; WMA does not specify, but common practice is to measure from the center). If the bottom of the indoor weight includes harness straps, then the length is measured to the bottom of the straps.

All rule books are now harmonized in that the maximum length of the implement, indoor or outdoor, is 410.0 mm.

WMA does not specify the lower point to which the length measurement is made, however adherence to the intent of the rule suggests that the measurement be made to the bottom of the complete implement. The maximum length is 410.0 mm.

Make sure the links are straight and not curled. For indoor weights, ensure the straps are at their "longest" positions; this is done by holding the weight by the handle and bouncing or jerking it up and down a few times to get the straps settled into position. Be aware of synthetic indoor weights that are not round. These have been deliberately flattened to ensure they meet the length specification. This is not allowed; the head itself must be round.

Indoor weights that fail the maximum length measurement due to stretched nylon straps are a common problem. These are corrected by disassembling the center link and twisting one or more straps, effectively shortening them. Alternately, a metal bushing or piece of 1/2" PVC pipe can be added to the lower clevis pin.



Like the hammer, the weight has diameter specifications for the head. USATF and WMA rules for the outdoor weight are harmonized. For the indoor weight they are harmonized at 15 mm greater than the outdoor implement for all except the 4 kg weight, but a USATF rules change is pending to match specs with WMA.

NCAA calls out the USATF specifications.

### D. Other Considerations

Weight handles are made of welded steel rod. Many designs also include permanent connection points. These are normally quite robust when considering the abusive environment in which they serve. However, once in a while, a weld joint can crack – such a handle

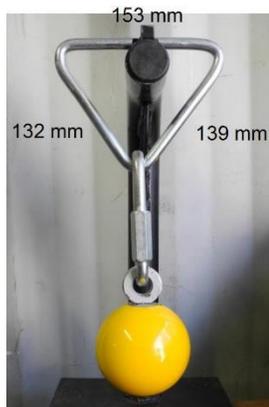
should be disqualified. The following image shows a weld failure on a handle; the break was covered by athletic tape.



Be alert for heads that have cracked and are leaking lead pellets. Tell-tale signs are: (1) A throwing weight that is underweight, and (2) a gray or blackish residue that covers part of the head and harness. In the case of the latter (above) the leaking lead pellets are being ground into dust between the head and harness during throws. This dust is toxic; the head must be retired permanently and disposed of in a proper fashion.

Be alert for illegal handles, particularly those which do not include a permanent connection point in their design (also called a "brace" herein).

This picture at right shows an outdoor handle with dimensions as marked. Under NCAA rules, a handle without a brace must have all sides of equal length; therefore, this implement would be disqualified. Under USATF rules, the handle would need to be rotated until the longest implement dimension is achieved before the length could be officially measured.



The handle and links should be inspected for integrity, and disqualified if there are signs of a structural problem. However, the head should be examined as well for erosion. The weight pictured here displays failure of the outer



shell and erosion of the fill material, resulting in a loss of mass. It should be disqualified and permanently retired.

The implement pictured below has a hammer handle and four connecting links. It is legal for WMA outdoor competition, but not for NCAA or USATF competition.



If the implement passes, then mark it appropriately. Colored electrical tape or duct tape can be wrapped on the sides of the handle. Like the hammer, this can serve as the certification symbol, and also identify weights of different sizes, particularly at Masters meets. Alternately, the top of the head can be spray-painted.

## DOCUMENT LINKS

The **2018** revision of the **Implement Inspector's Handbook**, along with the implement spec sheet, are available at:

<http://www.usatf.org/Resources-for---/groups-officials-/Officiating-Resources/Implement-Inspection.aspx>

and also at:

<http://www.usatf.org/Resources-for---/groups-officials-/Officiating-Resources/Implement-Inspection.aspx>

Given the possibility of Masters and Youth implement changes, look for a revision to the IIH early next year.

### EFSS newsletters

Recent editions of this newsletter are available at:

<http://www.usatf.org/Resources-for---/groups-officials-/Newsletters.aspx>

Older editions are available at:

<http://pacificnorthwest.usatf.org/Officials/Resources.aspx>

Summary of Reports  
College, Open & Masters

High School

		Total	Repairs	Reject	Per Cent	% Rep.	Total	Repairs	Reject	Per Cent	% Rep.				
Indoor Shot	Men	470	32	41	8.72%	6.81%									
	Women	598	28	44	7.36%	4.68%									
Outdoor Shot	Men	664	21	57	8.58%	3.16%	334	6	71	21.26%	1.80%	HS Rubber Discus Total Rejected Per Cent			
	Women	639	7	41	6.42%	1.10%	330	14	73	22.12%	4.24%				
Discus	Men	1161	51	59	5.08%	4.39%	512	27	42	8.20%	5.27%	20	19	95.00%	
	Women	1333	47	41	3.08%	3.53%	614	14	24	3.91%	2.28%	22	22	100.00%	
Javelin	Men	889	8	82	9.22%	0.90%	344	13	18	5.23%	3.78%				
	Women	990	24	26	2.63%	2.42%	349	24	19	5.44%	6.88%				
Hammer	Men	582	41	26	4.47%	7.04%									
	Women	705	23	90	12.77%	3.26%									
Weight	Men	266	33	16	6.02%	12.41%									
	Women	407	56	12	2.95%	13.76%									
Total		8704	371	535	6.15%	4.26%	2483	98	247	9.95%	3.95%				

**Combined Events**

		Total	Repairs	Reject	% Reject	% Rep.
Indoor Shot	Men	65	3	5	7.69%	4.62%
	Women	101	1	2	1.98%	0.99%
Outdoor Shot	Men	98	1	10	10.20%	1.02%
	Women	117	0	6	5.13%	0.00%
Javelin	Men	131	0	11	8.40%	0.00%
	Women	157	0	6	3.82%	0.00%
Discus	Men	166	3	6	3.61%	1.81%
Total		835	8	46	5.51%	0.96%

There were two implements that showed a higher than normal rate of rejection. Those would be the women's hammer and the men's javelin. The men's hammer shows a much higher rate of repair and most of the problems with the women's hammer are those that can usually be repaired with a new handle or wire. That suggests that the proper repair equipment was not available. The other possibility is that the women's hammers were not repaired when they could have been and I doubt that is the case. Time may have also been a factor. The men's javelins were primarily a balance problem. That is not repairable. It is most likely caused by wear on the tip.

The high school implements once again have a very high failure rate. In most states, there is little inspection done during the season and so the problems are found late in the season. There is also little care taken with the implements and so some get corroded.

The number of repairs is probably smaller than what actually happened. Some meets did not report the number of repairs and so were listed as not having any. In some cases that was due to time constraints on the inspector. It is more important to get the implement repaired and into competition than in keeping track of how many were repaired. In many meets, there were more repairs than rejects. I did not include tightening of screws on the weight. This is such a minor, but important repair, that many of them are not reported.

The high school statistics are not really good for comparison as the number of reports is very small. More reports are needed in that area. Most of what shows here are from meets in one area of the country and so probably have the same implement reported several times. I would not place much credence in those results due to the lack of general results. I doubt the reports are representative.