



Why does my case mouth bottom out on the bullet comparator when comparing Base to Ogive?

Answer: The new Hornady Bullet Comparators were designed to optimize comparisons between the base to ogive of bullets. We did design it so that it can also compare base to ogive of cartridges, but do to the large array of different cartridges we were not able to optimize the design to work with all cartridge base to ogive measurements. As a solution, our old bullet comparators are compatible with the Precision Measurement Station. We recommend using these for the cartridges who's case mouth bottoms out on the comparators included with the Precision Measurement Station.

LNL Comparator Set of 7 – Item #: B234 (.224,,243,,257,,264,,277,,284,,308)

LNL Comparator Full Set – Item #: B14

Insert 17 – Item #: 69032

Insert 20 – Item #: 69045

Insert 22 – Item #: 69033

Insert 24 – Item #: 69034

Insert 25 – Item #: 69035

Insert 26 – Item #: 69036

Insert 27 – Item #: 69037

Insert 28 – Item #: 69038

Insert 30 – Item #: 69039

Insert 33 – Item #: 69040

Insert 35 – Item #: 69041

Insert 37 – Item #: 69042

Insert 41 – Item #: 69044

Insert 45 – Item #: 69043

Categorized in: Ammunition, Reloading Tools

How do I find what I'm looking for on the Hornady website?

You can search for items in a variety of ways using the search function in the upper right-hand corner of the website. Click on the icon shaped like a magnifying glass and then type in the search box that appears.

TIPS FOR USING THE SEARCH FEATURE

Search using the item number (e.g. 8204).

Search by keyword, such as the name of the product – Superformance for instance.

Do an exact phrase search by putting several words in quotation marks, such as "Magnum reloading block".

By adding an asterisk to a search term (such as ELD*), you can find anything from ELD-X to ELD Match.

Categorized in: Customer Service

Why aren't there more bullets in the Hornady 4DOF database?

Hornady technicians will continue to add Hornady projectiles and other bullet brands to the database. Testing is time-consuming, but rest assured, there will be more projectiles added to the library.

Categorized in: Ballistics, Bullets

How do I program my RAPiD Safe wristband to my RAPiD Safe?

The RFID chip in the wristband is located inside the buckle of the bracelet. Locate the red program button on the RAPiD Safe. Press and release the button to begin programming the wristband. The first available program location will begin to blink. Hold the wristband buckle within 1" of the illuminated RFID reader area on the top of the safe lid. If the programming was successful, the safe should beep two times and the available slot should go from blinking to solid red for approximately ten seconds. Verify the wristband is programmed by holding the tag over the RFID reader with the lid open. The motor should cycle after each scan. If the RFID tag does not program into the safe, the program function will time out after ten seconds and the safe will return to normal operation.

Categorized in: Hornady Security®

How do I teach children about firearm safety?

Please to reference a video produced by the National Shooting Sports Foundation and Project Child Safe. This video features U.S. Army veteran, shooting sports champion, hunter and mother Julie Golob and visits many different ways to discuss firearm safety with children and young adults.

Categorized in: Hornady Security®

What devices can I view the e-book on?

For the iTunes (Apple) iBook, it is available for iPhone, iPad, iPod Touch and Mac computers running the iBook App.

The Kindle version is best viewed on Kindle readers and tablet-size screens running the Kindle App, like Android tablets. The Kindle App does not allow zooming on fixed-size books. So, while it can be downloaded to the Kindle App on a smartphone, it is always viewed at full page on the screen, so the data is too small to read easily.

At this time, the handbook is not compatible with the Kindle for PC and Kindle for Mac applications. There is a Kindle Cloud Reader option with which PC and Mac users can view the handbook in their web browsers.

Kindle allows users to preview the handbook, and it is recommended to do this on your device running the Kindle App before purchasing.

Categorized in: Reloading Data & Techniques

Where can I purchase the Hornady Handbook of Cartridge Reloading as an e-book?

It is currently available in the iTunes Bookstore for Apple products (iPad, iPhone, iPod Touch and Mac) and Kindle Book Store for Kindle readers and Android tablets running the Kindle App.

Categorized in: Reloading Data & Techniques

How do I properly dispose of my Sonic Clean™ solution?

As supplied, this product is completely biodegradable and not hazardous waste as defined by the EPA Resource Conservation and Recovery Act (RCRA).

As with many other household cleaning products, it's possible that contamination by certain chemicals might cause the solution to be considered "hazardous" for disposal purposes. Since Hornady Manufacturing Company has no control over how this product is used, we cannot attempt to make determinations regarding proper disposal. If the consumer feels that the product may be hazardous, it is best to dispose of it at a local household hazardous waste collection site.

Categorized in: Reloading Data & Techniques, Reloading Tools

Is Hornady® One Shot® Sonic Clean™ Gun Parts Formula Pine Sol®?

No, Hornady® One Shot® Sonic Clean™ Gun Parts Formula is not Pine Sol®. Please refer to our Safety Data Sheet and compare it to the ingredient list for Pine Sol®. Although the Safety Data Sheet only lists ingredients that are deemed to be potentially hazardous per OSHA regulations, you will see that the two products are very different. The Hornady® One Shot® Sonic Clean™ Gun Parts Formula contains unique surfactants, emulsifiers and corrosion inhibitors. The formula was developed in cooperation with a laboratory we've worked with for many years, and several versions were created before we arrived at the final formulation. While Pine Sol® and Hornady® One Shot® Sonic Clean™ Gun Parts Formula utilize pine derivatives for their natural fragrance and antibacterial properties and both products contain water as a base solvent, the similarities end there.

Categorized in: Reloading Tools

How long will a quart container of One Shot® cleaning solution last?

One Shot® cleaning solution is a concentrate that is diluted 40-to-1 with water. This ratio provides approximately 64 tank refills per bottle for the 1.2L model.

Categorized in: Reloading Tools

Can I use other cleaning solutions in the Sonic Cleaner?

Hornady only recommends using [Hornady® One Shot® Cleaning Solutions](#).

- Case Cleaning Solution Item #043355
- Gun Cleaning Solution Item #043360

Categorized in: Reloading Tools

Do you offer Sonic Cleaners in 220-volt?

We currently have three models available in 220-volt:

- [1.2L Lock-N-Load® Sonic Cleaner](#) (Item #043351)
- [9L Hornady® Hot Tub™ Sonic Cleaner](#) (Item #043311)

Categorized in: Reloading Tools

Do Hornady® Sonic Cleaners need to cool completely between cycles?

Allowing your Sonic Cleaner to cool down for a couple of minutes between cycles will help extend the life of the machine. It can be operated, however, up to 24 minutes (three cycles) before it must be allowed to cool completely.

Categorized in: Reloading Tools

When using a Sonic Cleaner, why do some cases come clean faster than others?

The Sonic Cleaner's tub includes a centrally located transducer. Move the cases around between cycles to ensure more uniform cleaning.

Categorized in: Reloading Tools

Why is residue left in some of the cases after cleaning?

Hornady® Sonic Cleaners remove most of the carbon but may leave behind loosened traces of carbon in the case. Simply remove the carbon with a quick wipe of a cotton swab.

Categorized in: Reloading Tools

How do I know if my Sonic Cleaner is working properly?

Place a piece of aluminum measuring approximately 4 by 4 inches in the cleaning solution, and turn the machine on for a 480-second cycle. If the Sonic Cleaner is working properly, the center of the foil should be wrinkled and may contain small pinholes.

Categorized in: Reloading Tools

What is your privacy policy?

The link to our [Privacy Policy](#) is listed here and in the footer on each page of our site.

Categorized in: Customer Service

How can I get a hold of Hornady products, which are scarce in my neck of the woods?

The current political climate has caused extremely high demand on all shooting industry products, including ours. Empty retail shelves, long back orders and exaggerated price increases on online auction sites – all fueled by rumors and conjecture – have amplified concerns about the availability of ammunition and firearms-related items.

If the information you hear doesn't originate from Hornady Manufacturing, don't believe it.

Here are some rumors we've heard and questions we've received:

Have you stopped production, or has the government forced you to stop?

Not at all.

Did you stop selling bullets so you could only make loaded ammunition?

Absolutely not.

Since we can't find your product, you must be selling it all to the government.

Nope, less than 5% of our sales are to government entities.

Why can't you make more? Ramp up production? Turn on all the machines?

We've been steadily growing our production for a long time, especially the last five years. We've added presses, lathes, CNC equipment, people and space. Many popular items are produced 24 hours a day. Several hundred Hornady employees work overtime every week to produce as much as safely possible. If there is any question about that, please take a tour of the factory. You'll be amazed at what you see.

We are producing as much as we can, much more than last year, which was a lot more than the year before. No one wants to ship more during this time than we do.

We appreciate everyone's understanding and patience. We don't know when the situation will improve, so please bear with us a little longer. And remember, when it comes to Hornady Manufacturing, if you don't hear it from us, please don't believe it.

Categorized in: Customer Service

Why does load data listed in various manufacturers' loading manuals differ when loading the same cartridge?

The size of the specific firearm chamber, throat dimensions, seating depth, bullet profile, propellant variances and crimping depth can all contribute to variations in load data. The data found in the Hornady loading manual represents actual results derived in the Hornady Ballistics Laboratory. Hornady recommends that reloaders always start with the "starting load" and work up cautiously until they achieve the performance they're looking for. If pressure signs become evident, stop immediately and reduce the load or try another propellant.

Categorized in: Ballistics

What would the velocity of your ammunition be if using a shorter barrel?

Exact velocities can't be calculated because variables associated with individual chambers and/or barrels affect velocity, but on average, velocity gains or losses will be approximately 25 to 35 feet per second per inch of barrel difference. But that hold true for every load or every gun. To truly measure performance, the load should be tested over a chronograph.

Categorized in: Ballistics

Why does velocity differ from what's listed on the ammo box?

In order to comply with industry standards, Hornady publishes data for ammunition derived from testing with Sporting Arms and Ammunition Manufacturers Institute (SAAMI) specification test barrels. SAAMI specifies minimum and maximum chamber sizes and certain barrel lengths for certain cartridges. For instance, most rifle test barrels are 24 inches long. Due to variables associated with individual firearm chambers and/or barrels, velocities may be faster or slower than those published by Hornady.

Categorized in: Ballistics

Where can I find ballistics information?

Ballistics information for each bullet and cartridge is available on our online store. You'll see a tab called "Ballistics" at the top of each specific product page.

Categorized in: Ballistics

Does the rebate receipt I received with my order qualify as the original dealer's dated receipt?

The top example does not qualify as a receipt because it does not show the date of purchase or the item(s) purchased.

You should have received another receipt (bottom) that has all the required information. Please send this instead.

Categorized in: Promotions

Is there a way to reduce the shipping costs?

No. The full amount of shipping and handling is needed for every redemption.

Categorized in: Promotions

Will you throw away my paperwork if I did something wrong?

No. Don't be afraid to send your paperwork just because the form says, "Noncompliant requests will be eliminated without response." If you forget any information or if there is any problem with your redemption, we will return it to you with a letter telling you what the problem was.

Categorized in: Promotions

What do I do if I can't get the UPC removed from my die set without damaging it?

The UPC bar codes on the die boxes can be difficult to remove. Try using a hair dryer to loosen the glue before removing. Or you can also try putting the empty die box in the freezer for a while and then using a razor blade to remove the label. If it is ripped or torn, that's OK. You can tape the pieces onto the redemption form, and we will still accept it.

Categorized in: Promotions

Can I still get the free bullets if I received my qualifying item as a gift?

Yes, you can still get the free bullets as long as we get all the required paperwork:

- Original dated receipt with retailer's name.
- UPC from box or label.
- Check or money order for shipping and handling.

Categorized in: Promotions

What address should I list if I live in Hawaii (or Alaska) and mail cannot be delivered to my physical address?

We use the U.S. Postal Service to deliver bullets to Hawaii and Alaska, so please list your mailing address. P.O. boxes are allowed.

Categorized in: Promotions

How do I redeem my bullets if I bought my qualifying items online and don't have a receipt?

Please print out any invoice or order confirmation you received from the online company. Make sure the company's name, items purchased and date of purchase are shown.

Categorized in: Promotions

Can I send you a copy of my receipt so I can keep the original?

Yes, we can accept a copy of your original receipt. Please make sure the store's name, items purchased and date of purchase are shown.

Categorized in: Promotions

What is a UPC?

The UPC is the Universal Product Code or bar code.

For presses, powder measures and sonic cleaners, it's printed directly on the box. It's not a sticker or label. You'll need to cut it out of the cardboard box.

For die sets, it's a label stuck directly to the red die box.

The actual UPC from the product is required. We cannot accept store price codes, store labels or shipping labels.

Categorized in: Promotions

How do I redeem for several qualifying items on one receipt for the "Get Loaded" promotion?

Please fill out one redemption form for each qualifying item and enclose them in one envelope. We only need one copy of each receipt. We do need the correct amount of all shipping and handling charges, but they can be combined onto a single check or money order.

Categorized in: Promotions

Can I redeem my bullets for multiple items purchased, or am I limited to one redemption per household?

You can redeem for all the qualifying items purchased during the promotion period. Please fill out one redemption form for each qualifying item and enclose them in one envelope. We only need one copy of each receipt. We do need the correct amount of all shipping and handling charges, but they can be combined onto a single check or money order.

Categorized in: Promotions

Can I substitute another bullet if the bullets I want are not listed on the "Get Loaded" form?

The list of bullets is based on the most popular bullets used by a majority of our customers. Substitutions are not allowed.

Categorized in: Promotions

How long will it take to get bullets from the "Get Loaded" promotion?

It depends on how soon we get your request entered and whether the bullets are in stock. Please allow 12 to 16 weeks for delivery after your redemption is processed. If you provide an email address, you will receive an email confirmation once the order is entered. You will also receive an email confirmation once the bullets ship.

Categorized in: Promotions

How do I get my free bullets after buying an item that's supposed to qualify me for free bullets?

Please fill out the redemption form provided on the appropriate Promotional page. (See list at the bottom of page.) Follow the instructions on the form and mail it in to us.

Categorized in: Promotions

What do I do if I have a stuck case in a sizing die?

Please send it to us along with contact information and check for the return postage made out to Hornady Manufacturing. We can only accommodate requests for customers inside the USA due to licensing regulations for cartridge cases. We ask that you use Fedex, UPS or other direct shipping service. Using USPS may result in item being returned to customer.

Categorized in: Reloading Tools

What causes some cases not to adequately expand when loading range brass?

Case length uniformity is critical. If you set everything up with a case at the longer end of the spectrum and then run some cases that are considerably shorter, these cases will not be expanded to the same degree as the longer ones. For best results, sort cases by headstamp and ensure that cases are uniform in length.

Categorized in: [Reloading Data & Techniques](#)

How will the measure stop work on my Case Activated Powder Drop, which uses a 4-inch return spring oriented diagonally?

The measure stop and powder through expanders are only compatible with the Case Activated Powder Drop that we currently offer with the vertical return spring. Unfortunately, these are not compatible with the earlier CAPDs with the diagonal return spring.

Categorized in: [Reloading Tools](#)

If I don't plan on using a powder through expander, do I still need the measure stop?

No. If you're using the expander die that came with your die set for case expansion, you will use one of the sleeves in the Case Activated Powder Drop rather than a powder through expander. The measure stop is not necessary if you are using one of these sleeves.

Categorized in: [Reloading Tools](#)

Is the PTX stop necessary for .223 Remington or .308 Winchester (bottleneck cartridges)?

No, it is only recommended when a powder through expander is going to be used on straight-walled cartridges.

Categorized in: [Reloading Tools](#)

How do I get more taper crimp with my die?

PLEASE FOLLOW THESE SIMPLE STEPS:

1. Loosen the seater adjustment screw (very top milled piece) about three times.
2. Loosen the lock ring on the crimp adjustment screw (middle) and back it out about three turns.
3. Tighten the crimp adjustment screw down until you have the correct crimp.
4. After you have made the adjustment, lock the lock ring and reset your bullet seater adjustment screw to the correct seating depth.

Categorized in: [Reloading Data & Techniques](#)

How do I know what to buy for my reloading needs?

View the [Reloading Essentials](#) page to determine the size and type of reloading essentials you need.

Categorized in: [Reloading Tools](#)

What if I need a modified case?

Please include contact information, two fired pieces of brass (not deprimed or resized in case there are issues creating the modified case), as well as a check or money order for customers inside the USA. Please make checks payable to Hornady Manufacturing. We ask that you use Fedex, UPS or other direct shipping service. Using USPS may result in item returned to customer.

Categorized in: [Reloading Tools](#)

Beside the press, what do I need to get started reloading?

You will need the following items:

Reloading Handbook #99239
Lock-N-Load® Die Bushings (1 for each die)
One Shot® Spray Case Lube 5.5 ounce with Dyna Glide Plus #9991
Powder Funnel #586050
Universal Loading Block #480040
GS-1500 Grain Electronic Scale #050107
Primer Turning Plate #050006
Dial Caliper #050075
Dieset (1 for each caliber)
Shell Plate (1 for each caliber)
Standard Lock-N-Load® Metering Insert (1 for each caliber) #050120
Standard Lock-N-Load® Pistol Metering Insert (1 for each caliber) #050116
Primer Cleaner Large #390753
Primer Cleaner Small #390752
Chamfer Deburr Tool #050017
Accessory Handle Universal #190260

Categorized in: [Reloading Tools](#)

Do I need to convert my Lock-N-Load® AP press?

No, this new ejection system is not a required conversion. If you purchase new style shell plates, they will work with both the wire eject and EZ-JECT systems.

Categorized in: [Reloading Tools](#)

How do I make a shell plate exchange?

Hornady will convert your existing shell plates for \$15 per plate. Please call our sales department at 800-338-3220 to arrange authorization for sending in shell plates for conversion.

Categorized in: [Reloading Tools](#)

How do I adjust my 366 Auto shotshell press to load the new Winchester AA hulls?

Readjust Station 7 up to get the pressure off the case. It will usually need to be raised two complete turns. The manual calls for 7 to 9 threads above the jam nut. Around 10 to 11 turns will work for the new AA cases. After the adjustment, you may have a small hole in the center. This can be corrected by adjusting Station 6 down.

Categorized in: [Reloading Data & Techniques](#)

Where can I get a shotshell instruction manual?

Visit the [Shotshell Reloading User Manual](#) page. If the manual you need is not available, please call customer service.

Categorized in: [Customer Service](#), [Reloading Data & Techniques](#)

How can I get the expander on my size die out of the case?

Use black graphite from your hardware store as a neck lube. Dip the neck in it after you lube the outside of the case. The powder already has graphite in it, so it won't contaminate the powder.

Categorized in: [Reloading Tools](#)

Where can I get a metallic instruction manual?

Visit the [Metallic Reloading User Manual](#) page. If the manual you need is not available, please call customer service.

Categorized in: [Customer Service](#), [Reloading Data & Techniques](#)

How can I make my powder charges uniform?

Static can cause charges to vary. Rub a dryer sheet vigorously on the outside of the powder tube to discharge the static and make the charges uniform.

Categorized in: [Reloading Data & Techniques](#)

What is the Lock-N-Load® AP EZ-JECT Conversion Kit?

The Lock-N-Load® AP EZ-JECT conversion kit allows you to convert your LNL AP press (with serial number 7000 or higher) to use the EZ-JECT system. This system ejects cases without the need of an ejection wire and is standard on 2009 model presses.

Categorized in: [Reloading Tools](#)

What primer is used in 500 S&W cases?

Hornady's original cases for the 500 S&W were made with Large Pistol Primer pockets. New cases are marked "LR" and made with a Large Rifle Primer Pocket.

Categorized in: [Reloading Tools](#)

How do I adjust trickle speed on the Lock-N-Load® Auto Charge, serial number below 2840, to prevent overthrows?

**To verify the serial number of your machine, simply turn it over. It is clearly stamped on the silver sticker.

Reprogram the trickle speed to a slower speed.

1. Turn unit on and let it stabilize.
2. Press the "0" button. (Unit should beep once.)
3. Press the CAL button once.
4. A number between 0.0 and 25.5 will appear.
5. Press CAL button repeatedly until a number between 0.5 and 1.0 appears. The new trickle speed is 0.6.
6. NOTE: Pressing CAL will increase the number to 0.1 increments until it reaches 25.5. However, if you continue to press CAL, the number will cycle back to 0.1. This is usually the fastest way to reset the trickle speed.
7. NOTE: Pressing UNIT will decrease the number in 0.1 increments.
8. After reaching the new trickle speed, press BACK/CANCEL to store trickle speed and return to normal operation.
NOTE: The new trickle speed should be permanently stored even if the auto charge is turned off.

Categorized in: [Reloading Tools](#)

How do I adjust trickle speed on a Lock-N-Load® Auto Charge, serial number 2840 or above, to prevent overthrows?

**To verify the serial number of your machine, simply turn it over. It is clearly stamped on the silver sticker.

Solution:
Reprogram the trickle speed to a slower speed.

Turn unit on and let it stabilize.
Press and hold CAL button for 6 seconds. The screen will display "SET."
Press the SPEED button to increase the speed.
Normal factory setting is between 0.4 and 0.8.
Press the UNITS button to decrease the trickle speed.
After reaching the new trickle speed, press and hold BACK/CANCEL to store trickle speed and return to normal operation.
NOTE: Do not decrease the inner value lower than 0.1 or increase it more than 25.5.
NOTE: The new trickle speed is permanently stored even if the auto charge is turned off.

Often, slowing down to 0.3 or 0.4 grains is sufficient to dial the machine in.

To adjust the trickle start time:

Scale must be zeroed out with no target displayed. Additionally, if the scale is shut off or BACK/CANCEL is used, this number will need to be reset.

To increase the trickle time by adjusting the point when the unit goes from quick dispense to trickle:

Turn unit on and let it stabilize.
Hold MODE button for 2 seconds.
The screen will display "0.2" to indicate the trickle will begin trickling approximately 0.2 grains before the target weight.
Repeat Step 2 until desired start time is reached.
Standard trickle start time settings range from 0.2 to 1.6, depending on powder density.

Categorized in: Reloading Tools

Why isn't the rifle bullet feeder compatible with the pistol bullet feeder?

There are five main reasons:

The pistol bullet feeder has a 120-volt electrical system (power supply, motor and electrical connector). The rifle bullet feeder has a 12-volt electrical system to eliminate the potential for electrical shock from a 120-volt system. The rifle bullet feeder has a shutoff switch to prevent overfeeding. The pistol bullet feeder does not have the wiring attachments to support the shutoff switch.
The square tube that supports the pistol bullet feeder hopper is a fixed height. The rifle bullet feeder requires a taller and adjustable support tube so a wide range of cartridge and bullet lengths can be loaded. This would not be possible with the fixed-height bracket.
The hole in the hopper for the feed spring was moved to ensure reliable feeding of lightweight bullets.
NOTE: The feed angle was too shallow to reliably feed 40-grain VMAX bullets.
The feed plate, feed springs and feeder die are also different for the rifle system. Therefore, only about one-third of the parts in the .22-caliber rifle bullet feeder system are the same as the pistol bullet feeder. Most of these identical parts are hardware (nuts, bolts, screws, springs, gears, etc.) or other parts that are not practical to switch back and forth.

Categorized in: Reloading Tools

What calibers can I hand load or reload with Hodgdon Superformance powder?

Hornady started loading the Superformance line of ammunition in 2010. Hodgdon followed up with the introduction of a Superformance powder available for hand loaders. However, the one Superformance powder that Hodgdon sells is not usable in all rifle calibers. Like all powders, it has a particular burn rate and will work great in some cases, OK in others and should not be used in the rest. A hand loader wouldn't think of using Varget or Retumbo in all their calibers from 17 Hornet to 375 H&H. Neither should they think of Superformance in that way.

Hornady uses commercial-grade Superformance powders of varying burn rates and also blends powders to offer a full line of Superformance cartridges. The Superformance powder that Hodgdon sells is one particular burn rate that does well in some short magnum cartridges along with some others, which are listed in their load data and also in the latest editions of the Hornady Handbook of Cartridge Reloading.

Categorized in: Reloading Tools

Why are the drag curves convex nearly immediately if the effects are only significant at longer ranges?

For most projectiles, the effect of the tip beginning to change shape is nearly immediate. From the graph of the drag coefficient (Cd) vs. distance above, you can see that the change in the drag of the projectile starts to happen immediately and accelerates until it stabilizes at about 300 yards. This is for a high ballistic coefficient (BC) bullet, over a 0.300 G7. The effect is short-lived and not as severe for lower BC projectiles. With low-BC projectiles, like varmint bullets even at high velocity, the effect is virtually nonexistent. It should not be hard to visualize that a change of 4 to 6% in the drag of a moderate BC projectile over 200 to 300 yards, that is intended for 300- to 400-yard shooting, would not see much effect on the ballistics.

However, a change of 8 to 12% on a bullet intended to be fired to ranges of 800 to 1,000 yards will see a far greater effect on its ballistic performance. Drop and wind drift are functions of projectile drag and time of flight. Using JBM ballistics and Doppler radar data for the two projectiles discussed above, the Delrin-tipped projectile has a G7 of 0.281 over 400 yards and 0.273 over 1,000 yards. The Heat Shield™-tipped projectile has a G7 BC over 400 yards of 0.312 and a G7 BC of 0.301 over 1,000 yards. This shows the change in BC, of any standard, that does not match the drag performance of the projectile it is attempting to model. This is why drag coefficient is the only way to accurately analyze what is happening.

Using the above G7 radar calculated BCs, the difference in point of impact for the two projectiles at 400 yards is 0.2 minute of angle (MOA). The difference in point of impact of the two projectiles at 1,000 yards is 1.9 MOA. It doesn't really matter at shorter ranges but is very important for longer-range shooting. Calculating trajectories using the actual drag coefficient vs. Mach, the differences at distance are even greater. Shooting the two different projectiles at 400 and 1,000 yards gave results very close to those calculated. The effects, at shorter ranges, for lower BC projectiles is even less. For existing standard type hunting and varmint projectiles, with current tips, this doesn't matter. That is not the case for long-range match and hunting and shooting situations.

Categorized in: Heat Shield Technology

Couldn't limit cycle yaw cause what you are seeing with the drag coefficient at supersonic velocities?

Not with anything other than a grossly under-stabilized projectile. If limit cycle yaw was the root cause of the observed increase in drag short range, we would have seen the same drag signature regardless of tip used. Limit cycle yaw is a phenomenon associated with some projectiles in which, because of their shape and their stability, they begin to fly with some persistent level of yaw. This phenomenon occurs almost exclusively at long ranges at low supersonic or subsonic Mach numbers. The shape of the boattail plays into this because of the aerodynamic changes that are occurring to a bullet as it gets nearer to Mach 1.0. Short or steep boat tails tend to exacerbate this problem. However, we are talking about low supersonic Mach numbers when a projectile is a long way from the muzzle. We are also talking about projectiles that do not have short or steep boattails. Figure 2 shows the radar-generated drag coefficient (Cd) vs. distance graph at supersonic Mach numbers for the same 6.5 mm 140-grain ELD™ Match projectiles discussed above. As can be seen from the graph, the Heat Shield™-tipped projectile has a very normal looking drag curve. The Delrin-tipped projectile immediately sees a rapid rise in drag as compared to the Heat Shield™ projectile and maintains this higher level of drag offset until low supersonic Mach numbers, where the Meplat diameter has much less of an effect on drag. The two plots do not come back to the same starting point because of the separation, offset, between the radar head and the rifle.

Drag Coefficient vs Distance

The yaw necessary to produce the drag effects seen in the Delrin-tipped bullet would have to occur at the muzzle and be nearly 10 degrees in order to produce the initial performance observed. This type of yaw would have been readily evident on yaw cards placed downrange, and it is not. Furthermore, with the gyroscopic stability (Sg) this projectile was fired at, by using a 6 degree of freedom trajectory calculator, this initial yaw would be damped to less than 0.5 degree by 250 yards. The drag curve for the Delrin-tipped projectile would show an initial convex "bubble" on the curve out to about 200 yards and return to essentially the same curve as the Heat Shield™-tipped projectile by 300 yards if in-flight yaw near the muzzle was the source of the observed drag increase. The phenomenon being observed can only be accounted for by a rapid and sustained change in the shape of the projectile, the polymer tip.

Categorized in: Heat Shield Technology

Would insufficient spin rate cause what you're seeing in the drag behavior of some of these projectiles?

In situations involving extreme lack of gyroscopic stability (Sg), effects similar to what we witnessed could contribute to the effects we observed. Extensive radar testing proves this is not what is occurring. We perform extensive bullet modeling for both mass and aerodynamic properties using state-of-the-art, military-grade software called PRODAS, which has been in use since the early 1970s. This allows extremely accurate and high-definition modeling of projectile flight performance and predictions of stability. We have been using this software since the early 1990s. We have been using Sg for analysis of projectile stability and determination of appropriate twist rate for several decades. We generally design for a worse case Sg of 1.5 under cold, dense atmospheric conditions to allow margin for variability in twist rates. All projectiles tested and data presented were tested under conditions in which the Sg was in the 1.8 to 2.1 range. For example, in the graph shown, the 7 mm 175-grain Hornady and Nosler bullets were fired from a 7 mm Remington Magnum with a 1-9.25" twist, and the Sgs were 2.05 and 1.95 respectively for the atmospheric conditions. To further put this question to bed, Figure 1 shows the radar generated drag coefficient (Cd) vs. Mach number graph at supersonic Mach numbers for identical 6.5 mm 140-grain ELD™ Match projectiles that were literally made serially with the only difference being the tip material. They were both fired from the same 6.5 mm Creedmoor rifle at approximately 2,780 feet per second (fps), with a 1-8" twist, within seconds of each other. The Sg for these projectiles in the atmospheric conditions was 1.80. These projectiles had enough spin to be adequately stabilized.

ELD Match Cd vs Mach

As can be seen from the graph, the Heat Shield™-tipped projectile has a very normal looking drag curve. The Delrin-tipped projectile immediately sees a rapid rise in drag as compared to the Heat Shield™ projectile and maintains this higher level of drag offset until low supersonic Mach numbers, where the Meplat diameter has much less of an effect on drag. The two plots do not start at the same place at high Mach numbers because of the separation, offset, between the radar head and the rifle. (You can't shoot through the middle of the radar head. That would be a very expensive mistake.) It takes the projectiles 40 to 50 yards to fly into the radar beam. The projectiles are acting exactly like they should for what is happening to them or not happening to them. This phenomenon is happening to everyone's polymer-tipped projectiles, not just ours.

Categorized in: Heat Shield Technology

Would the drop in BC you claim to see be caused by the normal change in BC at lower velocities?

No, it would not. The drop in ballistic coefficient (BC) associated with a bullet flying down range as it slows down is driven by two things. First, it is caused mostly by the drag coefficient (Cd) versus Mach number (drag model) of the standard not being at all like the actual drag coefficient versus Mach number of the projectile that is being evaluated. In the case of G1, at Mach numbers above 2.0, the slope of the Cd versus Mach is fairly close to modern boattail type projectiles and gives reasonable approximations. Below Mach 2.0, the G1 Cd vs. Mach becomes more and more dissimilar to a modern boattail type projectile, and this is why the BC numbers drop. The problem is not as bad with the G7 drag model. Unless the projectile being evaluated matches the shape and Cd vs. Mach of the standard projectile being used, errors are going to occur. The phenomenon we were seeing was happening immediately and was happening rapidly. It was totally inconsistent with the known problems with using BC.

Secondly, another problem arises when testing is done to determine multiple BC values. Testers usually take a standard twist rate for a given caliber and download to shoot at lower velocities. This results in abnormally slow spin rates on the projectile being tested for the velocity it is traveling, which changes the gyroscopic stability, muzzle tip off, body shank wear and limit cycle yaw, further muddying the whole BC issue. The spin of a projectile typically drops off at a dramatically slower rate than its velocity, causing an increase in gyroscopic stability (Sg). For example, using the PRODAS 6 degree of freedom (6 DOF) trajectory analysis on the 6.5 mm 140 ELD™ Match projectile, discussed below, fired from a 1:8" twist barrel at 2,780 feet per second (fps), has a spin rate of 26,272 rads per second (rad/sec) at the muzzle. At 800 yards, the projectile still has a spin rate of 22,145 rad/sec, nearly 85% of the muzzle value. Yet the retained velocity is only 1,825 fps, 65% of the muzzle value. If the same bullet were fired from the same twist barrel at 1,825 fps, the spin rate would be 17,214 rad/sec, 22% less than it should be at that velocity. This also makes the stability of the bullet 22% less than it should be at that point in its trajectory.

We never used G1 from the beginning because of its gross differences in drag characteristics to the aerodynamically efficient projectiles we were testing. This problem with BCs is why you will see us discussing projectile performance from now on in terms of the drag coefficient. It is the radar-generated exact total drag for the projectile being evaluated.

Categorized in: Heat Shield Technology

If the BC degrades with older tip material, how accurate are trajectory predictions?

They become progressively more inaccurate beyond ranges of 300 to 400 yards. The effects of changing ballistic coefficients (BC) with distance can be modeled with several commercially available ballistic calculators, but it is virtually impossible to know what the actual BC changes are without Doppler radar data. Reducing velocity to measure the simulated BC in mid-flight does not reflect the effects of aerodynamic heating on the tip.

Categorized in: Heat Shield Technology

What's the maximum range for acceptable terminal performance with ELD-X bullets?

It depends on retained velocity and is therefore cartridge dependent. In general, the ELD-X bullets will provide reliable and effective terminal performance up to velocities of approximately 1,600 feet per second.

Categorized in: Bullets, Heat Shield Technology

Are you encouraging people to shoot animals at long range?

No, we are simply providing a bullet that is capable of excellent terminal performance, accuracy and reduced wind drift that is lethal at ranges from near and far. It's our opinion that you should get as close to your quarry as possible. In certain instances, you simply shouldn't take the shot.

Categorized in: Heat Shield Technology

If tips melt, why not just shoot targets and animals with non-tipped BTHP bullets?

The new Heat Shield tipped bullets provide both aeroballistic and terminal performance advantages. The class-leading ballistic coefficients provide flatter trajectories, less wind drift and higher impact velocities. The ELD bullets provide terminal performance far superior to traditional bullet designs over a much wider range of velocities. Repeated laboratory and field testing has shown that BTHP bullet designs do not provide reliable or predictable terminal performance. Hornady does not recommend the use of BTHP bullets, regardless of the manufacturer for big game hunting.

Categorized in: Heat Shield Technology

How can you claim such high BCs?

All ballistic coefficients (BCs) were determined using Doppler radar by measuring bullet velocity as a function of distance to ranges of up to one mile. Doppler radar provides velocity measurements roughly every one to two feet of the bullet's flight, resulting in exact measurements of velocity loss due to drag. By using state-of-the-art aeroballistics software (6DOF), large amounts of data can be analyzed and computed to provide extremely accurate determinations of projectile drag.

Categorized in: Heat Shield Technology

Why should I buy your BTHP Match bullets if your tipped bullets are so good?

For match use, many shooters find that one bullet shoots better in their specific rifle than others. BTHP bullets provide another option for match and target shooters to tune loads for the specific application.

Categorized in: Heat Shield Technology

Why didn't Hornady put the Heat Shield Tip in all of its other tipped bullets?

Doppler radar testing has shown that tip deformation or melting occurs out to ranges of 500 to 600 yards, depending on the ballistic coefficient. Bullets designed for conventional ranges up to 400 yards, such as the SST, do not have long enough time of flight over these distances to show a significant effect of tip deformation in a field shooting environment. However, at longer ranges and time of flight, these effects become substantial, contributing to bullet drop, wind drift, terminal performance and accuracy due to increased drag and drag variability.

Categorized in: Bullets, Heat Shield Technology

At what temperature do standard tips melt?

Every bullet manufacturer's tips begin to melt and deform depending on their specific material properties. In general, standard acetals and Delrins, currently used in bullet tips, begin to soften and deform at 150 to 200 degrees (F). At 250 to 350 degrees (F), they will begin to melt and badly deform. The longer the exposure to these types of temperatures, the more deformation will occur. This generally begins to occur from 50 to 100 yards of the bullet leaving the muzzle. Even though the effect is measurable with Doppler radar early in the bullet's flight, the effect on point of impact for ranges out to approximately 400 yards is small enough that it can't be exposed during shooting. Time of flight is not long enough up to 400 yards to expose the increase in drag that is measured by point of impact. Beyond 400 yards, however, the time of flight becomes long enough that the increase in the drag due to tip melting can be exposed during shooting and will result in vertically elongated groups and a lower point of impact than predicted.

Categorized in: Heat Shield Technology

Does velocity make tips melt, or is it just a matter of exposure to aerodynamic friction over time?

It is a function of the softening point of the plastic, air temperature, ballistic coefficient (BC) and the maximum velocity. Basically, it is how long the bullet tip is exposed to what level of temperature. The higher the muzzle velocity, the higher the maximum temperature on the tip. The higher the BC, the longer the tip is exposed to higher temperatures. The longer the exposure and the higher the temperature, the more tip deformation will occur.

Categorized in: Heat Shield Technology

Will the jacket and core of ELD-X bullets separate since they're not bonded?

ELD-X BULLET JACKET/CORE SEPARATION

High-velocity impacts may occasionally cause the ELD-X bullet jacket to roll back past the InterLock ring during penetration, leading to jacket core separation as the bullet comes to rest. When bullets stop inside an animal, the elasticity of the flesh, and especially the hide, pulls the bullet backward into the animal and often flips the direction of the bullet around due to the weight being heavier on the frontal expanded area. Bullets expanded past their InterLock may separate at this point. While some may argue that this is a negative jacket and core separation, it is happening after the penetration, not at the beginning. The extremely light bullet jacket cannot penetrate to the offside of the animal without the lead core.

The ELD-X is a revolutionary new style of bullet and raises the bar for all projectiles. It is unconventional in its capabilities and its performance. As far as recovered bullets are concerned, the lethality of ELD-X bullets speaks for itself. For further explanation, please see below.

ELD-X BULLET TERMINAL PERFORMANCE EXPLAINED

Hornady ELD-X (Extremely Low Drag – eXpanding) bullets are designed to provide reliable expansion at both conventional and extended ranges. Coupled with high ballistic coefficients (BC) and match-grade accuracy, these hunting bullets are as good on the range as they are in the field. Designing a bullet that will expand at conventional 2,800 to 3,200 feet per second (fps) down to as low as 1,600 fps is no small task. Typical tipped or soft-point style lead-core bullets stop expanding reliably at 1,800 fps or slightly lower. Solid copper or copper-alloy style bullets typically need well over 2,000 fps to expand reliably. Over the years, hunters have tended to use match bullets for their long-range (low-velocity) needs as they offer the accuracy to hit targets at longer ranges and the bullets had a better chance at disrupting (though not expanding in a traditional fashion) to help cause damage. The match bullets' (especially BTHP designs) disruption is rarely consistent and can include anything from tumbling to fragmenting to passing through like an FMJ bullet and depends more on what it hits to cause disruption than working by design. Another downside of using match bullets for hunting is high-velocity (close range impacts tend to make match bullets fragment on impact and not reach penetration depths needed for humane kills on game).

The ELD-X bullet provides deep penetration and reliable expansion at both ends of the velocity spectrum. This sets it apart from all other bullets on the market. Achieving this kind of terminal flexibility requires unconventional performance. For a bullet to expand at 1,600 fps, it is imperative that the frontal area open up, or mushroom, very quickly. Conventional bullets that expand at low velocity will blow up or fragment upon high-velocity impacts. Conversely, bullets that are designed for deep penetration at close range (high-velocity impact) won't expand at low velocity and rarely provide the accuracy needed for longer-range hunting nor have high enough BCs to retain energy and reduce wind deflection. ELD-X bullets are designed with a thin-jacketed frontal area that expands at low velocity and a gradually thicker jacket and InterLock ring that keep the shank together to penetrate at high-velocity impacts. The nose of the ELD-X is designed to expand by being initiated by the Heat Shield tip. Contact of the tip and game animal forces the tip back into the jacket, starting the expansion process. Expansion of long-range, lower-velocity impacts is limited by the continually thickening jacket design and typically resembles a traditional mushroomed bullet. Eighty to 90% weight retention can be expected, and 20 to 24 inches of penetration is common.

At closer-range impacts, the nose rapidly expands due to the higher velocity. Some of the thin jacket material that guarantees slower velocity expansion may be shed in this process until the thick-jacketed portion of the nose is reached. This slight shedding of the thin nose section typically results in retained weights of 50 to 60%. Even though more weight is lost, terminal performance is almost identical to that of longer-range impacts with penetrations of 20 to 24 inches and very large wound cavities. If impact velocities are high enough, the ELD-X will continue to expand until reaching the high InterLock ring, where expansion will be slowed dramatically due to the thick shank of the jacket. Unconventional in its performance, the ELD-X may not resemble traditional designs, but its wound channel and penetration characteristics are equal to or greater than traditional designs at traditional ranges.

Hornady engineers have worked hard to design the ELD-X bullet to balance between expanding quickly but not expanding too quickly. A mechanical Interlock ring is swaged high on the shank to help keep the jacket and core material together. While any traditional "cup and core" bullet can suffer from jacket and core separation, it is not common. Keep in mind that an average bullet encounters severely more energy upon impact when hitting game than it did to form the bullet during manufacturing. With all of the various angles at which bullets encounter tough hide, bone and tissue, there is a tremendous amount of impact on the bullets and occasionally strange things can happen. While bonded bullets may not allow the separation of jacket and core materials, they are not typically capable of the accuracy needed for extended-range shooting.

Categorized in: Ammunition, Bullets

Is Hornady +P ammunition safe to use in my handgun?

Hornady +P ammunition is manufactured to industry +P standards and is safe to use in any firearm that is regulated to +P pressures.

Categorized in: Ammunition

How do I return ammunition?

All Hornady ammunition is warranted against material and workmanship defects. If the ammunition is found to be defective due to material or workmanship, Hornady will replace the defective ammunition at no charge to the customer.

All ammunition warranty claims are handled on a case-by-case basis. In order to initiate a claim, please contact our Customer Service Technicians.

All ammunition warranty claims must have a Return Authorization (RA) number assigned before acceptance at our facility for further examination. Please DO NOT send ammunition without obtaining a RA number from our Customer Service staff.

NOTE: Improper storage and handling of ammunition may result in damage to the product. The appearance of exposure, corrosion or any other evidence of damage that occurred after the product was sold will void any warranties.

Categorized in: Ammunition

What happened to the Light Magnum® and Heavy Magnum® lines of ammunition?

With the advent of Superformance™ Ammunition, Light Magnum® and Heavy Magnum® Ammunition have been discontinued.

"Superformance ammunition provides all the positives of Light and Heavy Magnum (increased velocity without increased barrel wear) but has added benefits, as well. Simply stated, Superformance provides 100 to 200 feet per second faster muzzle velocities than any conventional ammunition. There's no increase in felt recoil, no sacrifice in accuracy, and it gives up far less velocity when shot from shorter-barreled rifles. Superformance is also friendly for use in all guns, including semi-autos, unlike Light and Heavy Magnum, which had a pressure curve that wasn't conducive for use in semi-autos." - Jason Hornady, Vice President/Director of Sales

Originally developed and pioneered by Hornady in the early 1990s, both Light Magnum® and Heavy Magnum® ammunition set the original standard for increased performance by providing higher velocity and energy from existing cartridges through a proprietary propellant and loading process. As revolutionary as this product was, it has now simply been eclipsed. Superformance™ ammunition is a 21st-century shift in ammunition technology. There are no gimmicks, no compromises, only benefits. It's faster (100 to 200 fps faster than any conventional ammunition on the market), extremely accurate, and there's NO increase in felt recoil (unlike Light Magnum® and Heavy Magnum®).

Categorized in: Ammunition

Why are the new Heat Shield™ (ELD-X™ & ELD™ Match) tips a solid color instead of translucent?

Hornady® ELD-X™ and ELD™ Match bullets that feature the Heat Shield™ tip are transitioning from a translucent red to a more opaque red color to avoid a trademark conflict with another manufacturer. The increase in red dye does not affect the performance of the new Heat Shield™ tip and its ability to resist deformation due to aerodynamic heating. The new color of the Heat Shield™ tip is a deeper shade of red than any other Hornady® bullet tip, leaving it unique in the Hornady® product line.

Categorized in: Bullets, Heat Shield Technology