Use NFPA-1936 to Help Compare Rescue Tools' Performance

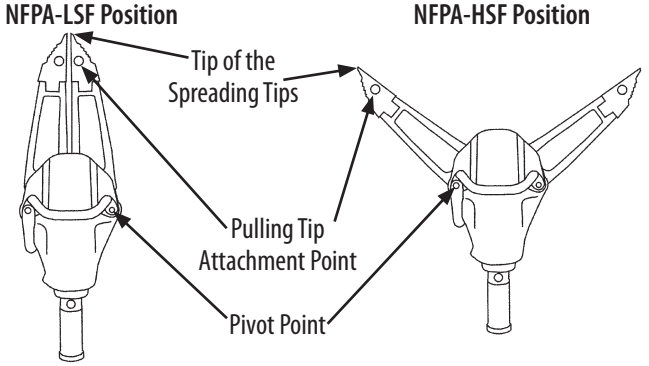
This article explains how to use NFPA-1936's required performance testing to assist when comparing rescue tools. The standard has been in effect since August 1999, yet few customers actually use its tests when evaluating rescue tools, rather they rely on each manufacturer's published "max forces".

MISCONCEPTION #1: *When Comparing NFPA Compliant Spreaders Are Manufacturers' Max Spreading Forces Checked By Testing Companies?*

ANSWER: NO! *The NFPA Standard requires testing companies to perform force testing, but is done in a different, more accurate way. It results in much lower but more accurate scores across the board.*

NFPA-1936 Section 6-2: Spreader Force Test:

1. The spreader (or combination spreader/cutter) is placed in a fixture for force testing where the arms are attached at the pulling tip attachment point.
2. Hydraulic pressure is brought up to maximum input pressure of the system.
3. Maximum spreading forces are measured and recorded at 10 uniformly spaced intervals, ranging from the fully closed position to 95 percent of the fully open position.
4. Mathematical Calculation – used to calculate force at the tip-of-the-tips, from measured force nearby at the pulling attachment point. This calculation lowers the force from what is measured at the attachment point to what is actually experienced at the tip-of-the-tips.



1) Engineers measure Force at the pulling tip attachment point. 2) Multiply Force by the distance from the pivot point to the pulling attachment point then 3) Divide by the longer distance from the pivot point to the tip of the spreading tip. The resulting calculation is Force at the tip of the tips.

NFPA-LSF (Lowest Spreading Force)

Because of leverage, the LSF is ALWAYS the measurement when the arms are closed – or just barely beginning their spread. And is calculated to the "tip of the tips" where the tool has its least amount of spreading force.

For auto extrication, LSF is the most useful comparison because it is where you normally start your spread and where the auto still has its greatest strength. It's also where the tool produces its least force, so having more force at this position is very helpful…!

NFPA-HSF (Highest Spreading Force)

Because of leverage, the HSF is ALWAYS measured at NFPA-1936's maximum arm opening of 95% open.

The HSF is "nice to know", and is a third-party calculation, but normally the work has long been done before the arms get to 95% open. It is when the tool has its highest power, but also when the material being spread is at its weakest state.

Spreaders would produce a higher force with arms @ 100% open than @ 95% open, but the NFPA committee wanted to ensure the HSF max force was measured where the tool still had 5% of useable spread remaining.

Manufacturers' "Max Forces" for Spreaders (non-NFPA) – Where are they measured?

There is no requirement on where manufacturers measure their maximum forces…so it is all over the board. Because of the inconsistency of how measured, "max force" is not a good force to compare. It will not be accurate.

MISCONCEPTION #2: *When Comparing NFPA Compliant Cutters Are Manufacturers' Max Cutting Forces Checked By Testing Companies?*

ANSWER: NO! *There is no standard for where tool manufacturers measure their maximum cutting force. It is a theoretical calculation, and depending on how the manufacturer calculates this force, the forces can be all over the board…*

The NFPA Standard requires testing companies to do performance testing on cutters to prove their actual real world cutting ability. This helps to "level the playing field" and give more accurate representation of tools' cutting abilities.

NFPA-1936 Section 6-13: Cutter Performance Test:

1. The cutter (or combi-cutter) endures a performance test with cutting a particular grade of steel to determine its cutting performance. There are 5 shape categories (A through E), and 9 different thickness levels per shape (1 through 9).
2. Tool must pass the test with only one set of blades, and the cutter has to completely sever the material of each cut in a single continuous motion.
3. The cutter is operated to cut 12 pieces of the largest size material and the 5 shape categories that the tool is capable of cutting…a minimum of 60 cuts for certification. If the cutter makes 11 cuts of a shape and fails to complete the 12th cut in a single continuous motion, the tool fails the test and will likely have to drop down to the next lower thickness level for retest.
4. The Cutter Performance Level Rating shall be expressed as follows: A#/B#/C#/D#/E#, with # being the thickness level from 1 to 9.

What Can You Do – When Evaluating Rescue Tools?

Demand each supplier supply "cut sheets" including their NFPA testing data for every piece of equipment being proposed, for your review. And some additional notes…

1. Some companies (such as Genesis Rescue Systems) have their performance data available on-line, and also downloadable "cut sheets" that include all NFPA performance testing levels.
2. If supplier does not display their performance data in catalogs or their website, you may be able to find it in their tool manual. Per NFPA-1936, Section 3-2.5, this data is supposed to be PUBLIC (not private), and listed in each tool's manual.
3. Buyer Beware: If any supplier tells you he will provide secret performance data that you cannot share with anybody, there is likely a problem with the credibility of the information.
4. Data provided should have the testing company's stamp on it. Popular testing companies for rescue tools include TÜV SÜD (which literally means TÜV South in German), and UL. Seeing the testing company's stamp on the info gives some assurance the manufacturer would get "in hot water" if something is not correct.
5. All the data in the world does not replace the need to do a hands-on demo, to make sure you like the equipment. But the fact is – third party performance testing has been available for over a decade to assist when buying rescue tools and "to date", few customers actually use it.

Article submitted by Scott Slater, Vice President of Operations for Santiam Emergency Equipment, who has 22 years of technical experience in supporting rescue tool sales, service, and extrication training.

SHAPE A	SHAPE B	SHAPE C	SHAPE D	SHAPE E
Round Bar A-36 HR Thickness: 1 to 9	Flat Bar A-36 HR Thickness: 1 to 9	Round Pipe Sch. 40 A-53 Gr. B Thickness: 1 to 9	Square Tube A-500 Grade B Thickness: 1 to 9	Angle Iron A-36 Thickness: 1 to 9