



FOLLOW UP: ALERT 0903241 - MANIFOLD FAILURE TEST REPORT

Snap-tite Hose, Inc.

Date: 4/3/09

Customer: Lambertville Fire Department, Lambertville, NJ

Contact: George Fosdick, President (New Jersey Fire Equipment Company)

Ref: RGA A1034

Product: MS40M25N

Reason for Return: Catastrophic failure of the manifold

BACKGROUND

Snap-tite Hose received notice of a catastrophic failure of a 5 way manifold thru our dealer New Jersey Fire Equipment. This manifold had originally been sold to Lambertville in 1999 thru another dealer, J.B.Hunt. To the best of our knowledge, this appliance has never been returned to Snap-tite for repair or refurbishment.

The incident in question occurred on or before March 24, 2009, according to the dates on the emails in the attached, while the manifold was in use by Lambertville on a fire scene. At least one firefighter experienced minor injuries. Following are several points of note from the email accounts we received. (See attached).

1. A loud noise 'like a freight train' was heard before the failure occurred.
2. The gauge on the manifold did not register an increase in pressure (this was mentioned several times).
3. The local water company notified fire department personnel that they had 'high pressure on the hydrant' requiring manual control of the pressure at the pump station.
4. The relief valve on the manifold did not relieve.

The fire department also submitted several photos of the failed appliance, see following.



NYS Department of State

OFFICE OF
**FIRE PREVENTION
 & CONTROL**

phone 518.474.6746
fax 518.474.3240
email fire@dos.state.ny.us



SNAP-TITE EVALUATION

Inspection: The manifold was received on the afternoon of 4/2/09 and evaluated by the Snap-tite Quality Assurance Manager on the morning of 4/3/09. Photos of the manifold were taken as received, before the parts were removed from the carton, and of each part as it was removed from the carton.

A visual inspection was made of each component. Some general observations were made as follow.

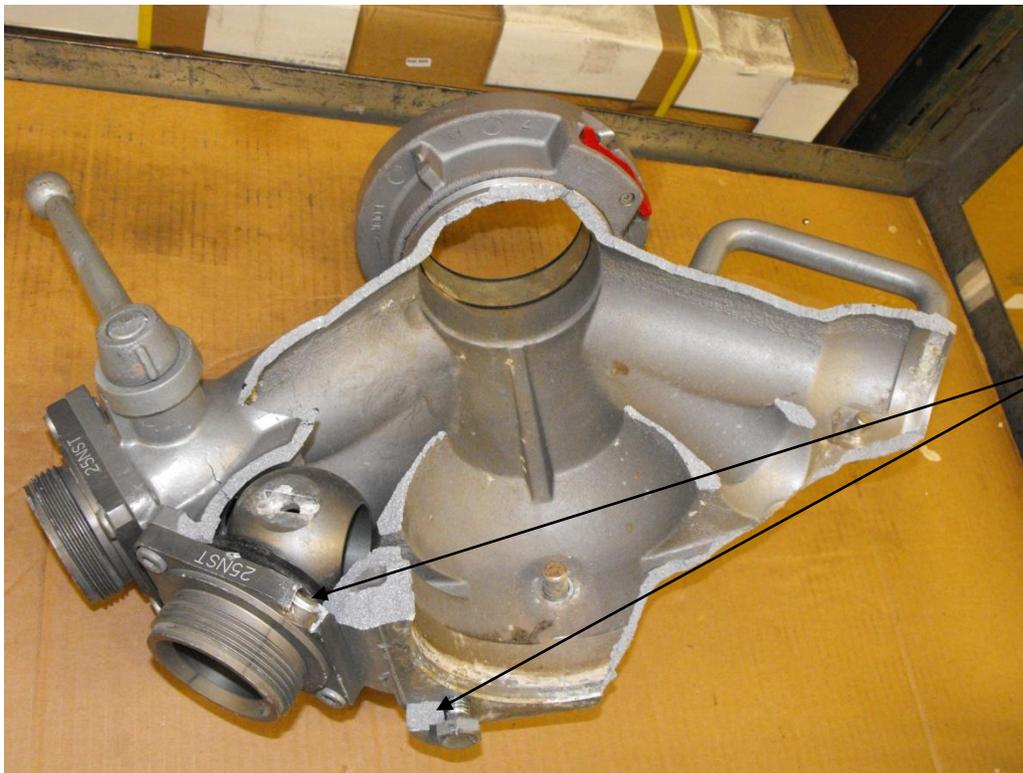
1. The manifold is date stamped 06 99.
2. It exhibited little corrosion internally and it was generally clean inside and out. The remaining ball valves operated freely.
3. There was no obvious indication of damage caused by an impact such as would occur by dropping the unit, although this was difficult to discern because of the condition of the unit after the failure.
4. There was no porosity or discontinuity in the casting, visible to the naked eye, at any point along the failure.
5. There was no indication of corrosion anywhere along the casting separation lines (corrosion would indicate a crack had existed for some time). The surfaces at the separation were clean and shiny, except for a few spots which were dirty from the fire scene.

6. Numerous other cracks were noted in the casting, apparently caused by the same forces that caused the catastrophic failure.

Several photos taken at Snap-tite follow, along with comments.



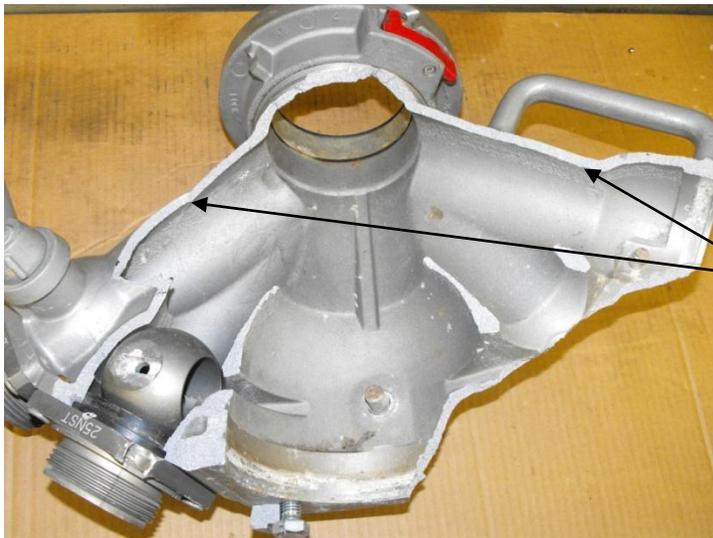
The manifold parts as received except with some packing material removed. Although inconsequential to this investigation, note the handle protruding thru the side of the carton.



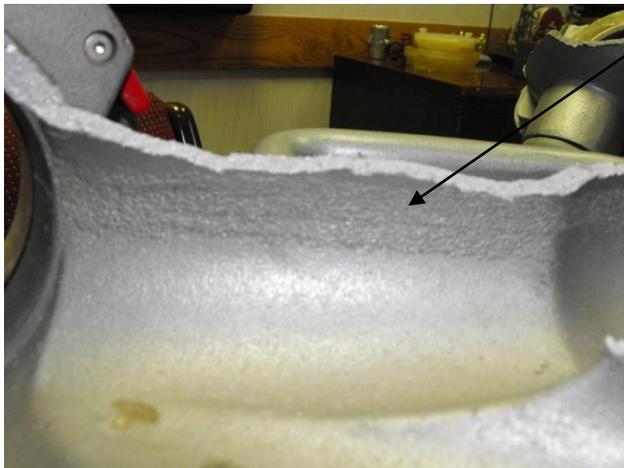
The largest portion of the casting. Note the clean casting at all points along the break. Note failure of two of the connection flanges indicating substantial forces were experienced.



Close-up view of the damaged flange.

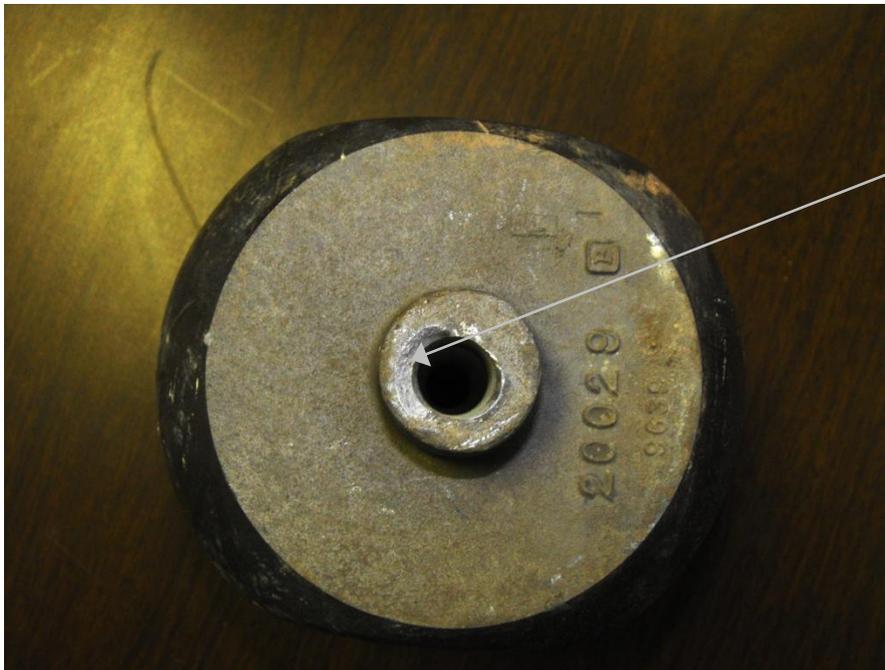


Failure occurred above the casting lines which speaks to the integrity of the casting. A compromised casting would tend to fail within the parting line itself.





The other major portion of the manifold. Note clean casting along the failure. Also note the broken flange on the Storz adapter, again illustrating that substantial force was applied.



The large ball from the 4 inch port. Note the substantial damage to the pin opening. Part of the casting is broken out of the hole. This is an indication of a substantial pressure being applied to the ball and forcing it out of it's normal position.

Examination of the casting reveals no casting flaws that would result in a failure of this magnitude. There was also no evidence of corrosion anywhere along the failure line which would indicate the presence of a pre-existing flaw or crack. The manifold casting appears to have been in serviceable condition prior to the failure.

Additionally, the age of the manifold speaks to it's integrity. The unit is approximately 10 years old and manufacturing flaws would likely have been revealed within the first year.

Snap-tite's history with these units is very good. They are rarely returned for warranty repairs and there have been no warranty catastrophic failures.

An extreme failure such as this can only occur by exposing the manifold to a sudden, significant pressure spike well above the rated burst pressure of the casting. As the attached literature indicates, the manifold is rated to 710 psi burst pressure, therefore the unit experienced a pressure substantially higher than this.

Controlled burst tests in the lab never result in the extent of damage caused to this manifold. Typically as a casting reaches it's burst point, a crack develops which allows the pressure within the casting to dissipate and no further damage is done. We have never experienced a burst on an appliance where the casting actually explodes such as appears to have occurred in this situation.

RELIEF VALVE EVALUATION

In the course of this evaluation the relief valve was examined with the following findings.

The relief valve was removed from the manifold and placed in a test fixture. The test pressure rapidly increased to over 300 psi before the test could be stopped because the valve failed to open. The pressure was then held at 300 psi for several minutes with no change in the position of the valve.

The set screw was then backed out and the valve re-tested. Again, the valve did not open. At this point the valve was disassembled and found to be heavily corroded. The photo below illustrates the relief cartridge with heavy external corrosion. In this photo the springs are intact within the valve and under normal conditions should be able to move the piston out of the bore, but are prevented from doing so by corrosion. The cartridge was subsequently lubricated, then heated, but still could not be taken apart.





Attempting to compress the relief cartridge in a vise to loosen the corrosion.

It is apparent that the relief valve was not maintained or tested as suggested by NFPA 1962, Chapter 8. Periodic testing of the valve would have detected that it was non-operational.

It should be noted that the relief valve would likely not have prevented damage to the manifold in this situation since it appears that the manifold was subjected to a sudden, significant pressure increase. As stated in NFPA 1965, par.A.4.4, relief valves are not designed to relieve water hammer, which is described as a sudden pressure increase in the system.

CONCLUSION

It is apparent from the evidence provided that the cause of this failure was a severe over-pressure condition, such as water hammer. Fire Department personnel state that they were careful not to create any conditions that might result in water hammer. The actions of the water authority should be closely examined as they did admit that they had caused an overpressure in the system. Improper operation of a valve in their system could have set up a water hammer condition which travelled through the hydrant and to the manifold.

For more information on water hammer there are many articles on the web. Two comprehensive articles can be found at <http://www.pump-zone.com/pumps/pumps/the-causes-of-water-hammer-part-one.html> and <http://www.pump-zone.com/valves/valves/water-hammer-part-two-causes-and-variables.html>.

RECOMMENDATIONS

1. Water hammer is an extremely destructive force and must be prevented at all costs.
2. Due to the significant damage caused to this appliance, Snap-tite Hose highly recommends a thorough inspection of other components which may have been subjected to this pressure

spike. This would include other appliances, hoses, connectors, adapters, and perhaps truck piping and pumps.

3. Relief valve maintenance is critical to the safety of personnel and equipment. The guidelines for appliance maintenance and testing as established in NFPA 1962 are highly recommended. We recommend that all relief valves be immediately tested for proper operation, and that a schedule be created and maintained.
4. All appliances should be service tested annually as recommended by NFPA 1962.

Submitted by: Robert Dunn
Quality Assurance Manager
Snap-tite Hose, Inc.
217 Titusville Rd.
Union City, PA 16438

Cover letter and email from New Jersey Fire Equipment:



FROM

(FRI) MAR 27 2009 7:36/ST. 7:36/No. 7500000978 P 1

Action Fire Apparatus Company, Inc., dba



NEW JERSEY FIRE EQUIPMENT COMPANY

Apparatus, Equipment, Hose, Supplies

923 N. Washington Ave.
Green Brook, N.J. 08812
Tel. 732-968-2121
Fax. 732-968-4724
www.njfe.com

March 27, 2009

FAX: 814-438-8163
page 1 of 2

To: Carolyn Green
SNAPTITE INC.

re: MS50M25N Manifold
(referred to by Customer as "Street Hydrant")
sold to LAMBERTVILLE, NEW JERSEY - 1999
Vendor: J.B. HUNT COMPANY

Carolyn:

Lambertville is now a Customer of ours and, since we are a SNAPTITE Authorized Dealer, they have asked us to help. As indicated above, they purchased a MS50M25N Manifold in 1999, through J.B. HUNT COMPANY. The enclosed e-mails to and from our Sales Representative, Charley Patkochis, report that this valve "exploded." We now have the valve here.

Lambertville anticipates that SNAPTITE will evaluate this valve and report findings. This needs to be done, sooner, rather than later.

As noted, we have the valve here, in pieces, and request that SNAPTITE forward an RGA along with return instructions.

Please advise ASAP.

Thank you.

George D. Fosdick
President

enc.
cc: C. Patkochis

Windows Live Hotmail Print Message

RE: Portable Hydrant

From: **Cindy Tillet** (tnt1517@hotmail.com)
Sent: Tue 3/24/09 9:42 PM
To: Charlie Patkochis (cpatkochis@hotmail.com); Columbia Fire Company (columbia4@msn.com)

I know for a fact that the truck was not in pump. My father told me that there was 120 pounds of pressure coming off the hydrant and 100 going out. That is what the portable hydrant was reading before it exploded. He also said that the gauge on the pump never moved when the portable hydrant exploded. Now I do have to say that right after the portable hydrant exploded, a woman from the water company came down, introduced herself and said that they were sorry for the high pressure on the hydrant and that a guy was up at the pumping station controlling the pressure. But like I said the pressure never changed on the pumper or the gauge on the portable hydrant. And if we did get an in flux of pressure on the supply end, the relief valve would have gone off. I honestly think it was a reverse water hammer (from the tanker). That is the only thing I can think of. Accident's happen and I'm not looking to blame anyone, I just want to figure out what happened so no one in the future gets hurt and we can prevent this from happening. We are very serious about tanker task force and we drill on it a lot. I pride myself on my companies abilities of getting water fast and safe. I know we weren't doing anything different on our end as to the way we set up and filled the tanker. If you have any more questions please feel free to ask.
Thank you again Charlie,

Cindy

From: cpatkochis@hotmail.com
To: tnt1517@hotmail.com
Subject: RE: Portable Hydrant
Date: Tue, 24 Mar 2009 15:20:16 -0400

Thanks. Need to know was the pump in gear and what was the pressure at the pump panel. Also, what was the gauge on the street hydrant reading when you were filling?
I want you to know I'm not looking to blame anyone. This is a very bad situation which needs to be figured out because we always control the street hydrant just as you were doing when we fill tenders.
Regards,
Charley P.

From: tnt1517@hotmail.com
To: cpatkochis@hotmail.com; columbia4@msn.com
Subject: Portable Hydrant
Date: Tue, 24 Mar 2009 14:59:23 -0400

Hi Charlie:

Here is what happened...

We were filling Kingwood's tanker, the water started to flow out of the bottom of it (which means it's full) and I started to slowly shut the two valves which were filling the tanker. Just before they were fully shut off I heard this noise, it got louder and louder, like a freight train coming, I glanced at the gauge on the top to see if the relief valve was going to go off and it wasn't moving so I decided to move out of the way. Just as I started to move there was a very loud noise (as if a shot gun went off) and I was soaking wet and my foot really hurt. I turned around to see the portable hydrant had exploded. I was standing to the right of this valve while it was in operation. I've attached some pictures right after it happened, (remember I was on the right side) the other two on the left weren't even being used yet and were not hooked up to a tanker. I hope this helps, if there are any questions please feel free to contact me.

Manifold brochure (click below to open Adobe)

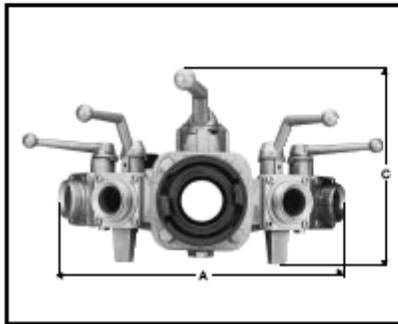


Hardware Specification



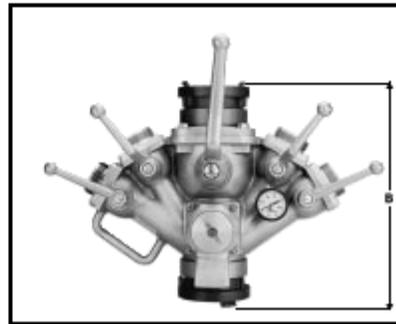
Manifold - M

The Snap-tite Manifold is designed to be a lightweight, compact, portable valve used to supply multiple attack lines and take advantage of the increased flow capability of Large Diameter Hose. The Manifold features one (1) large gated outlet and four (4) individually gated outlets, recessed glycerine filled pressure gauge, adjustable relief valve and convenient carrying handle.



Width (A)

Height (C)



Length (B)

Description

4" Snap-tite/Storz Intake (4) 2-1/2" NST Male Outlets and (1) 4" Snap-tite/Storz Gated Outlet.
 5" Snap-tite/Storz Intake to (4) 2-1/2" NST Male Outlets and (1) 4" Snap-tite/Storz Gated Outlet.
 5" Snap-tite/Storz Intake to (4) 2-1/2" NST Male Outlets and (1) 5" Snap-tite/Storz Gated Outlet

Part Number

MS40M25N
 MS50M25N
 MS51M25N

Weight

50 lb.
 54 lb.
 50 lb.

Dimensions

A	B	C
21"	17"	12"
21"	17"	12"
21"	17"	12"

Technical Data

Material: Valve body - high strength aluminum alloy - 356-T6
Finish: Hard coat anodized and electro-painting throughout - minimum thickness .002"
Pressure Ratings: 290 psi (20 bar) working pressure, 425 psi (30 bar) test pressure, 710 psi (55 bar) minimum burst pressure
Waterway: 4.5"
Relief Valve: Double spring, cartridge type, adjustable from 50 to 200 psi (5 to 15 bar).
Sizes: 4", 5" and 6" Storz x 2-1/2" and 3" female or male outlets
Warranty: 1 year warranty against defects in material and workmanship.

Snap-tite Hose, Inc. • 217 Titusville Rd. • Union City, Pennsylvania 16438-8898 USA • PH: 814/438-7616 • FX: 814/438-7619
 Snap-tite Europe, B.V. • Industrial Estate • Whitmill • Wexford • Republic of Ireland • PH: 353/53-41506 • FX: 353/53-41582