

Stainless Braided PTFE V Rubber

Reason for Report

To establish the benefits of Stainless Steel Braided Hose versus Rubber Hose, specifically when used in Brake applications.

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Test Requirements

- Volumetric Expansion – This test is required for FMVSS 106 & SAE J1401. The results will determine the level of brake pedal feel experienced during depression of brake pedal. In addition the results will have a positive/negative effect with regard to the vehicle stopping distances (dependent on any other brake assist features incorporated within the braking system of a specific vehicle).
- Burst Pressure/Working Pressure. Required for FMVSS106 & SAE J1401
- Whip Test. Required for FMVSS106 & SAE J1401
- Hose Life Expectancy.



Results for Volumetric Expansion

Requirement as per FMVSS106

Low Expansion Hose – 0.33 cc/ft(1.08cc/m) @ 1000 PSI
 0.42 cc/ft(1.38cc/m) @ 1500 PSI
 0.61 cc/ft(2.00cc/m) @ 2900 PSI

Result -

Stainless Braided PTFE Hose –

First recordable data at 0.010% (0.0002932cc/ft) @ 4000 PSI.

Rubber Hose - (Data supplied by UK Rubber Hose Manufacturer).

Note – results may vary slightly dependent on manufacturer.

0.136 cc/ft @ 1000 PSI
0.150 cc/ft @ 1500 PSI
0.290 cc/ft @ 2900 PSI

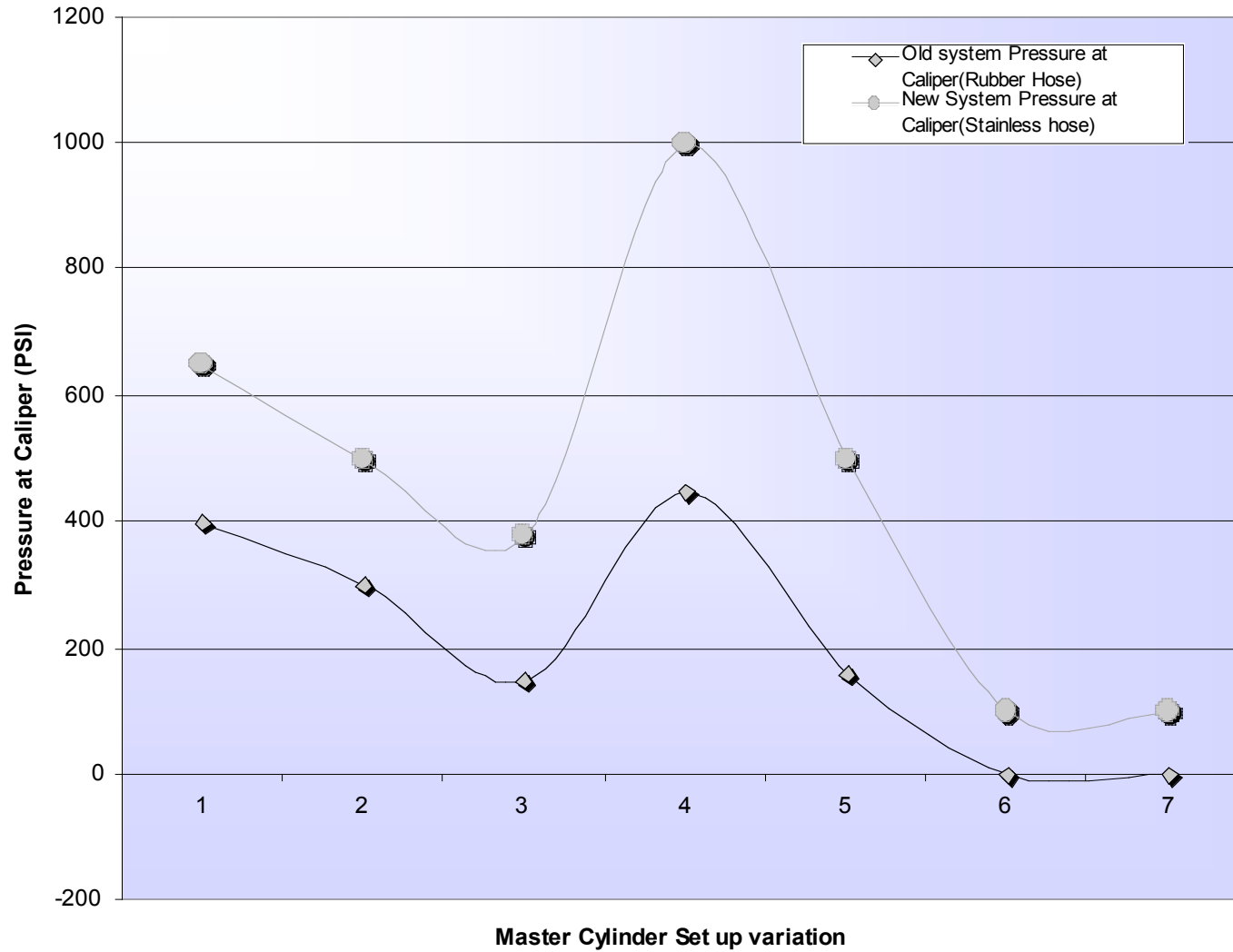


Volumetric Expansion Conclusion

- Although the Rubber hose does meet the requirements of FMVSS106 it is clear from the results that the almost zero expansion rate of the braided hose cannot fail to have a positive effect on brake pedal feel/pressure at caliper and, potentially, stopping distances.
- To demonstrate the ACTUAL effect this would have we requested performance data from one of our key customers.



UK Engineering Consultancy Brake System development comparison





Results for Burst/Working Pressure

Requirement as per FMVSS106 / SAE J1401

100 % PRESSURE TEST all hose assemblies.

3000 – 3600 PSI – Hose assembly shall show no signs of leakage/rupture.

BURST TEST – required for initial approval.

4000 PSI FOR 2 minutes. Pressure is then increased to 7000 PSI.

Hose assembly shall show no signs of leakage/rupture.

Result -

Stainless Braided PTFE Hose – Burst test result 12750 – 13500 PSI

Recommended Safe working pressure 4250 PSI

Rubber Hose – (Data supplied by UK Rubber hose manufacturer)

Note – Hose data supplied by other rubber hose manufacturers may vary.

Burst test results – 8000 – 9000 PSI

Recommended Safe working pressure 3600 PSI



Burst/Working Pressure Conclusion

Although the Rubber hose meets the requirements the safe working Pressure quoted is no higher than the 100% pressure test requirement.

Also the burst test results give a SAFETY FACTOR OF 2.36 when divided into the *quoted* safe working pressure.

The Stainless Braided hose has a SAFETY FACTOR of 3.00 with a much greater burst pressure.



Results for Whip Test

Requirement;

A Hydraulic brake hose assembly shall not rupture when run continuously on a flexing machine for 35 hours.

Results;

Stainless Braided PTFE hose –

6 sets of tests carried out with varying hose lengths. Each set consists of 4 hoses.

Results range from 45 - 82 hours dependent on length of hose.

Date of tests Jan – Feb 2005

Rubber Hose –

Results stated by UK rubber hose manufacturer exceed 35 hours.

NB: Goodridge UK have performed internal tests on 5 rubber hose assemblies (each from a different supplier). The results range from 15 – 27 hours.



Whip Test Conclusion

Although the UK rubber hose manufacturer states compliance to the Whip Test as per FMVSS106, our internal testing of rubber hose assemblies shows **failure** of hoses prior to the 35 hours minimum requirement.

The Stainless Braid hose complies **fully** to the test requirement.



Hose Life Expectancy

There are no specific requirements for Hose Life Expectancy however this should be a consideration when deciding on which product should be selected for a specific application.

Results;

Stainless Braided PTFE Hose –

Guaranteed for Life of Vehicle, usually stated as 150,000 miles.

This is possible due to the high quality PTFE liner and the Stainless Steel Braid.

Rubber Hose -

3 years or 60,000 miles

Note - This is the average quoted life expectancy, We have not carried out any testing to verify this data.