

# 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.

Prepared by  
Adrian Nield  
Head of Engineering  
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## Test Requirements

- n 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).
- n Burst Pressure/Working Pressure. Required for FMVSS106 & SAE J1401
- n Whip Test. Required for FMVSS106 & SAE J1401
- n 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 - 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

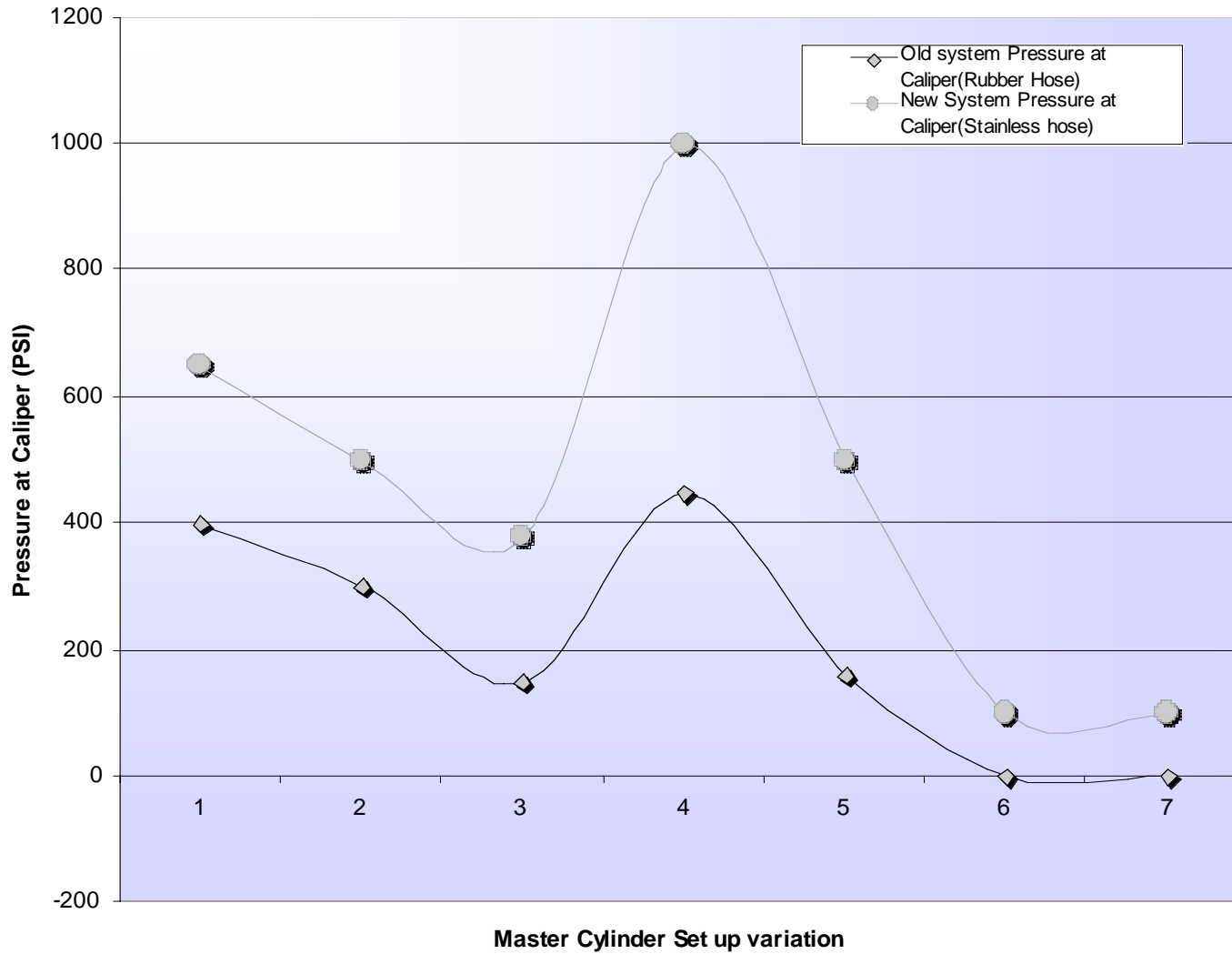


## Volumetric Expansion Conclusion

- n 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.
- n 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 –**

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 from 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.



**GOODRIDGE** 