



4WARD NO: 4605
JOB NO: 3057 D1365
CLIENT REF: PO 2019121101
REPORT NO: 2339



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REPORT

On the testing of Hydraulic Hose

Supplied by:

Mars One Cable
Cian Fe Pipe Industry Co Ltd
W4, Lane 104, Li Xin St
Dali District
Taichung
Taiwan

Report Prepared by:

Lesley Komatsu

Report on the testing of Hydraulic Hose

4ward Testing Ltd were contacted by Mars One Cable, Cian Fe Pipe Co Ltd of No 4, Lane 104, Li Xin Street, Dali District, Taichung, Taiwan and asked to carry out a range of tests on Hydraulic Hose.

Identification

Material:	Hydraulic Hose
Customer Identification:	OD 7.1mm/ID 3.4mm x 300mm in length
4ward Sample No:	4605
Customer Reference:	PO 2019121101
Job No:	3057
Date Received:	02/01/2020

Test Data

On receipt of the Hydraulic Hose they were sent to Venhill Engineering Ltd of 21 Ranmore Road, Dorking, RH4 1HE for the correct size end fittings to be attached. On return to the Laboratory the following tests were carried out.

Testing was to the following sections of FMVSS-106:2013

S5.3.1 Constriction

Drop ball test: A spherical ball, 64% in diameter of inside diameter of Hose under test is dropped through the Hose when held in a vertical orientation. The ball shall fall under gravity through the Hose without any restriction.

S5.3.2 Expansion & Burst Strength

The maximum expansion of the Hose under test at 1000, 1500, & 2900psi is calculated. The assembly shall then withstand a water pressure of 4,000psi for 2 mins without rupture and then shall not rupture at < 7000psi

S5.3.5 Water Absorption & Burst Strength

A Hose assembly is immersed in water at $85 \pm 2^{\circ}\text{C}$ for 70hrs. It is then removed and allowed to condition at room temperature before carrying out Burst strength. The Hose shall withstand 4000psi for 2 mins and shall not rupture at < 5000psi



S5.3.8 Low Temperature Resistance

A Hose is conditioned at $-45 \pm 2^{\circ}\text{C}$ for 70hrs after which it is wrapped 180° around a conditioned mandrel of 3" diameter in 3-5 secs. A visual examination is then carried out.

S5.3.9 Brake Fluid Compatibility, Constriction & Burst Strength

A Hose is filled with SAE RM-66-04, Compatibility Fluid and held vertically at $120 \pm 2^{\circ}\text{C}$ for 70hrs. The Hose is allowed to cool to room temperature and then a Burst test is carried out. The Hose shall withstand 4000psi for 2 mins and shall not rupture at $< 5000\text{psi}$

S5.3.10 Static Ozone Resistance

The Hose is wrapped around a Mandrel of nominal 8 x outside diameter of the hose and fixed in this position. It is then exposed to Ozone at $100 \pm 2\text{pphm}$ at 40°C for 70hrs. Following the exposure a visual examination is carried out using a 7 X magnification

S5.3.11 Dynamic Ozone Resistance

The Hose is held, with one end fixed, in such a way to continually cycle it at a rate of 0.3Hz for 48hrs at 40°C while being exposed to Ozone at $100 \pm 2\text{pphm}$. Following exposure a visual examination is carried out using 7 X magnification.



Results

Constriction

No Constriction in the Hose after any of the tests

Expansion & Burst Strength

psi	1000	1500	2900
S1 [CC/ft]	0.027	0.030	0.043
S2 [CC/ft]	0.018	0.025	0.039
S3 [CC/ft]	0.020	0.025	0.043
S4 [CC/ft]	0.016	0.021	0.039
Average	0.020	0.025	0.041

Table 1: Expansion results

psi	PSI	Failure mode
S1 [CC/ft]	10202	Left hand crimp off
S2 [CC/ft]	11780	Left hand crimp off
S3 [CC/ft]	10773	Left hand crimp off
S4 [CC/ft]	9316	Right hand crimp off
Average	10518	

Table 2: Burst results after expansion test

Water Absorption & Burst Strength

psi	PSI	Failure mode
[CC/ft]	6743	Right hand crimp off

Table 3: Burst results after water absorption exposure



Low Temperature Resistance

No visible cracks

Brake Fluid Compatibility, Constriction & Burst Strength

psi	PSI	Failure mode
[CC/ft]	7512	Left hand crimp off

Table 4: Burst results after brake fluid compatibility exposure

No Constriction in the Hose after the test

Static Ozone Resistance

No visible cracks

Dynamic Ozone Resistance

No visible cracks

These results refer only to the material tested



Work recorded by the following personnel:



Paula Fountain BSc MSc
Laboratory Technician



Richard Wright
Laboratory Technician

Work recorded and authorised by the following personnel:



Lesley Komatsu ACQI
Technical Manager

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