

Engineering Site Standard

GPC-MSS-111

Hoses

Endorsed: 13 December 2017

Brief description

This standard outlines the requirements for the use and procurement of hoses at GPC.

Document information

Current version	1
First released	13 December 2017
Last updated	13 December 2017
Effective by	13 December 2017
Review frequency	Biennially
Review before	13 December 2019
Audience	All GPC personnel and contractors

Document accountability

Role	Position
Owner	Technical Services Manager
Custodian	Specialist Mechanical Engineer

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Document Version Control

Version	Date	Author	Change Description
1	13/12/2017	D Lockwood	Issued for use

1. Scope

The purpose of this Standard is to minimise the risk of hose and connection failures, incompatible connections and fittings and contact with substances under pressure e.g. air and fluids.

2. Definitions

Approved Supplier	GPC authorised as a supplier to provide hose supply and / or inspection and testing services to GPC in accordance with this standard.
Pressure Hose	A complete fluid or air transfer system comprising flexible hose and attached adaptors, end connectors, clamps and securing devices.
Whipcheck	A hose restraint device which is fitted to a pressure hose to prevent uncontrolled movement of the hose in the case of hose and / or hose connection failure. Whipchecks are usually either fitted to the hose clamp / connection, or to the actual hose itself (i.e. 'sock' type).
Purchaser	A person who initiates the procurement process
Hose Register	An electronic register of all hoses on the GPC site
Approved Supplier Register	An electronic register of suppliers which have been deemed by GPC to be suitable to provide supply and / or inspection and testing services in accordance with this standard
Proprietary Mobile Plant	Brand name Mobile Plant manufactured by a recognised manufacturer of that type of equipment.
Proprietary Tooling	Tools for which GPC is not the designer. (e.g. Enerpac Rams)
Design Working Pressure	Maximum peak pressure the hose assembly is designed to operate.
Design Temperature	Maximum peak temperature the hose assembly is designed to operate.

3. References

3.1. Australian Standards

Standard	Title
AS 1180	Methods of test for hose made from elastomeric materials

AS 1335	Hose and hose assemblies for welding, cutting and allied processes
AS 1375	Industrial fuel-fired appliances
AS 2117	Hose and hose assemblies for petroleum and petroleum products
AS 2129	Flanges for pipes, valves and fittings
AS 2283	Elastomeric hose and hose assemblies for steam-cleaning machines
AS 2299	Occupational diving operations
AS 2554	Hose and hose assemblies for air
AS 2683	Hose and hose assemblies for distribution of petroleum and petroleum products
AS 3791	Hydraulic hose

3.2. International Standards

Standard	Title
ISO 7751	Rubber and plastic hoses and hose assemblies – Ratios of proof and burst pressure to design working pressure
SAE J343	Test and Test Procedures
SAE J516	Hydraulic Hose Fittings
SAE J517	Hose Assemblies, Hydraulic
SAE J518	Hydraulic Flanged Tube, Pipe, and Hose Connections, Four-Bolt Split Flange Type
SAE J1273	Recommended Practices for Hydraulic Hose Assemblies

4. Minimum Requirements for all Hoses

4.1. Hose Register

GPC must keep a register of all pressure hoses (Hose Register) on site. The register must be in electronic form and must contain the following information as a minimum;

- Unique hose identifier
- Hose Size
- Hose Service
- Hose Design Working Pressure

- Hose Test Pressure
- Purchase Date
- Last Hose Test Date
- Next Hose Test Due Date
- Hose Periodic Inspection and Testing Results
- Hose Status (e.g. in service, destroyed etc.)

The Hose Register must be made available for viewing by all GPC employees & contractors.

4.2. Approved Supplier Register

GPC must keep a register of approved hose suppliers (Approved Supplier Register) on site. The Approved Supplier Register must identify what services the supplier is approved to provide, including:

- Offsite supply of each type of hose listed in this standard
- Onsite Inspection and testing of each type of hose listed in this standard

Any supplier listed on the register must be assessed for compliance to the service(s) in which they are indicated as being approved to supply. The approved supplier register must be formally reviewed at a minimum interval of 1 year to ensure all suppliers maintain the approved supplier requirements. The approved supplier register must be made available for viewing by Purchasers.

4.3. Approved Supplier Requirements

An approved supplier must hold a current ISO 9001 accreditation covering the design, manufacturer, supply and inspection and testing of hoses and hose fittings for the type of hose(s) that supplier is to supply or inspect and test.

4.4. Hose Design

All hoses must be designed in full accordance with the relevant standard given in Section 3.0. The ratio of Proof Pressure & Minimum Burst Pressure to Design Working Pressure must be no less than given in Section 4.6.

4.5. Purchase Requirements

All hoses must only be procured from a supplier listed on the approved supplier register. It is the responsibility of the requisitioner to provide detailed information relating to the hoses or fitting required for use on site by using the “stamped” methodology.

Size	Internal size / external size if applicable
Temperature	Of conveyed product and surrounding ambient temp
Application	What application the hose is used in
Medium	What product is passing through the hose
Pressure	What is the design working pressure of the application

End fittings	What does it connect to.
Delivery	When do you need it

- From this information an Approved Supplier will select a hose for the application and provide an engineered standard to suit.
- All hoses and fittings must be supplied or repaired, recycled or sent through an Approved Supplier to ensure compliance to this standard.
- All hoses must comply with this standard.
- No persons on site are to manufacture adaptors for fitment to hoses that will introduce variations of the above standards. (i.e. Minsup or Chicago)
- No hoses are to be manufactured on site other than by Approved Supplier representatives. The purpose of this is to ensure hoses have consistent integrity, are fit for purpose and meet the requirements of hazards such as content or pressure.
- All hose assemblies for site must be packaged in such a way as to protect them from damage during shipping.
- The uses of alternative materials such as ALUMINIUM, BRONZE, BRASS, CAST IRON, and POLYMER must not be permitted unless written approval from the relevant MRU Manager is given.

4.6. Design & Assembly

All hoses are to be marked in accordance with the relevant Australian Standard or International Standard (refer Section 3 References for the list of Standards) and must be colour coded according to their use as given in Section 4.6 Design & Assembly with the exception of fire hoses and high pressure water blasting hoses.

All hoses, except fire hoses and high pressure water blasting hoses must have a permanent stainless steel tag attached which provides the following information:

- Manufacturers Name
- Unique identifier from the Hose Register
- Fluid
- Design Working Pressure in kPa and PSI
- Design Temperature in Deg C
- Proof Test Pressure
- Purchase Date
- Test Date
- Next Test Due Date.

The tag must be formed and attached in such a way to prevent the occurrence of injuries during manual handing of hoses. All hoses are to be designed and supplied in accordance with the following requirements for each hose type.

4.6.1. Plant Air

- To be supplied in colour blue fully assembled
- Provided in sizes 12.5mm, 19mm, 25mm and 38mm in 20 meter lengths.
- Safety pin provided for each coupling.

- Proof Pressure Tested in accordance with this standard.
- Ratio of Proof Pressure to design working pressure 2.0
- Ratio of minimum burst pressure to design working pressure 4.0
- S/steel tagged
- Fitting – ‘OETIKER swing airline couplings
- Crimp – Preformed double ‘junior’ BANDIT



4.6.2. Air Hose Reel

- Suitable for 50 metres of 12 mm hose, rated to 1600 kPa
- External case manufactured from composite materials
- Designed to manually extend, lock and recover hose with a spring locking ratchet design
- The hose reel shall be capable of swivelling 180° on a brass swivel.
- End fittings as per Section 4.7 Couplings and Attachments.



4.6.3. Process Water

- To be supplied in colour red fully assembled
- Provided in sizes 25mm, and 38mm in 20 meter lengths.
- Safety pin provided for each claw coupling.
- Proof Pressure Tested in accordance with this standard.
- Ratio of Proof Pressure to design working pressure 2.0
- Ratio of minimum burst pressure to design working pressure 4.0
- S/steel tagged
- Fitting – Minsup “A”
- Crimp – Preformed double ‘junior’ bandit



4.6.4. Lay-flat water hose

- To be supplied in colour orange or yellow, fully assembled with kamlock couplings each end
- Nominal sizes 76 mm and 102 mm
- Continuous length 100 metres
- Maximum working pressure 3500 kPa
- High Abrasion polyurethane cover
- Crimp – Preformed double ‘junior’ bandit

4.6.5. Steam

- To be supplied in colour red with blue 'Lay Line' fully assembled
- Provided in sizes 19mm, 25mm, 38mm and 50mm in 20mtr. Lengths
- Whip check retention
- Proof Pressure Tested in accordance with this standard.
- Ratio of Proof Pressure to design working pressure 5.0
- Ratio of minimum burst pressure to design working pressure 10.0
- Stainless steel tagged
- Fitting – Steam ground joint fittings (both ends)
- Crimp – Four bolt interlocking clamp



4.6.6. Proprietary hydraulic hoses

This section shall be read in conjunction with GPC Hydraulics Specification MSS-109. Should any conflict arise, the more stringent of specifications shall be used.

For hydraulic hoses located on proprietary mobile plant, the follow apply:

- All hydraulic hoses on propriety mobile plant must be purchased, inspected, tested and maintained in strict accordance with the manufacturers' instructions.
- All other hoses on proprietary mobile plant must comply with the requirements given in Section 4.8.

For hydraulic hoses located on proprietary tooling, the following apply;

- All hydraulic hoses on propriety tooling must be purchased, inspected, tested and maintained in strict accordance with the manufacturer's instructions. Unless approved otherwise by the manufacturer in writing, all replacement hydraulic hoses must be purchased from the original plant manufacturer.
- All other hoses on proprietary tooling must comply with the requirements given in Section 4.8.

4.6.7. Fuel / Oil / Hydraulic

This section shall be read in conjunction with GPC Hydraulics Specification MSS-109. Should any conflict arise, the more stringent of specifications shall be used.

- To be supplied in colour black fully assembled.
- All hoses assemblies will be lay lined with working pressure, burst pressure and size
- Sizes from 6mm to 100mm
- End fittings JIC [Male and females] SAE Flanges
- Proof Pressure Tested in accordance with this standard.
- Ratio of Proof Pressure to design working pressure 2.0
- Ratio of minimum burst pressure to design working pressure 4.0
- Stainless steel tag applied.
- Hydraulic grade swage for all H.P. assemblies. [Low pressure large bore return lines must be double bandit clamp either ends]



4.6.8. High Pressure Water (Hydro blasting) Hoses

- To be purchased fully assembled by the hydro blast contractor.
- All hoses to be assembled using protective hose cover.
- Sizes available are 6mm through to 25mm.
- Pressure tested with a certificate by the supplier of the hose.
- All hoses must be stamped matching the information on the test certificate (stainless steel tag not applicable)
- Lengths may vary to suit application.

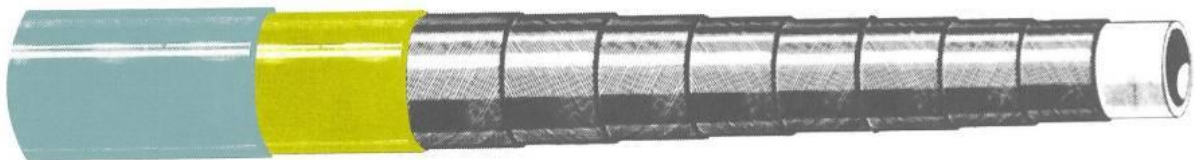


Figure 1 Thermoplastic hoses to 4000 bar

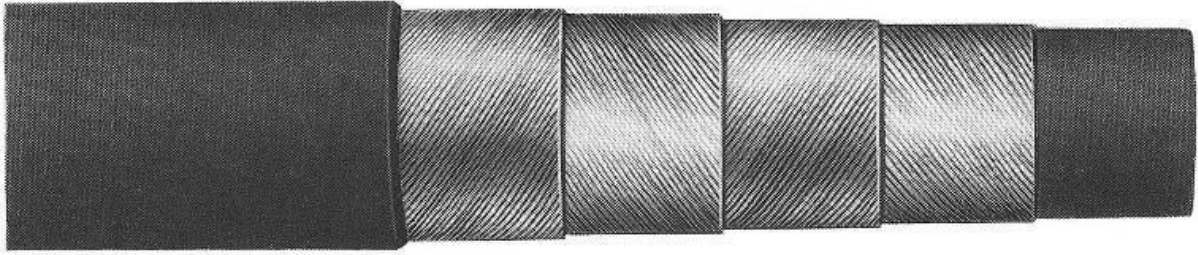


Figure 2 Rubber hoses to 1400 bar

- Hoses for brand name portable water blasting units must be purchased from a supplier supplying hoses manufactured by the equipment original manufacturer.

4.6.9. High Pressure Jacking Hoses

- To be supplied in orange fully assembled.
- All hoses to be assembled using Protective hose cover each end
- Sizes available 6mm and 10mm only
- End fittings typically NPT male ¼ and 3/8
- Proof Pressure Tested in accordance with this standard.
- Ratio of Proof Pressure to design working pressure 2.0

Ratio of minimum burst pressure to design working pressure 4.0

- Stainless steel tag applied
- Lengths may vary to suit application



4.6.10. Self-Store Air Hose

- Hose is to be supplied in blue fully assembled
- Hoses sizes available 6mm, 10mm, 12mm and 19mm.
- End fittings will be type "A" coupling and a quick release air fitting [NITTO] at the other end.
- Hoses are supplied with a spring guard at each end to prevent the bend radius being exceeded.
- Stainless steel tag applied
- Proof Pressure Tested in accordance with this standard.
- Ratio of Proof Pressure to design working pressure 2.0

- Ratio of minimum burst pressure to design working pressure 4.0
- Crimp method is compression
- Working length is normally 10 metres



4.7. Couplings and Attachments



Figure 3 TYPE "A" MINSUP or CHICAGO Fitting



Figure 4 "QUICK RELEASE AIR FITTING"



Figure 5 KAMLOCK

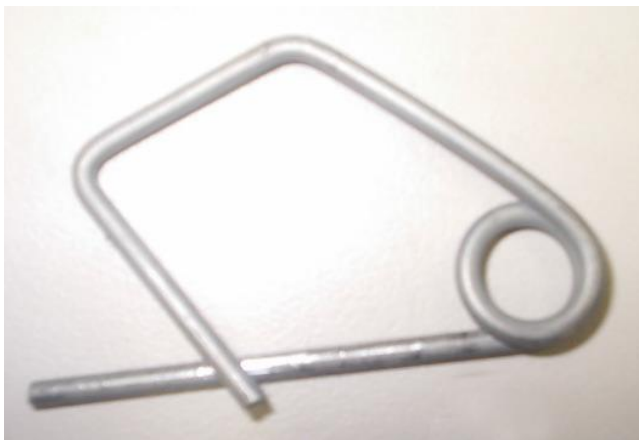


Figure 6 SAFETY CLIP



Figure 7 FLANGE FITTING

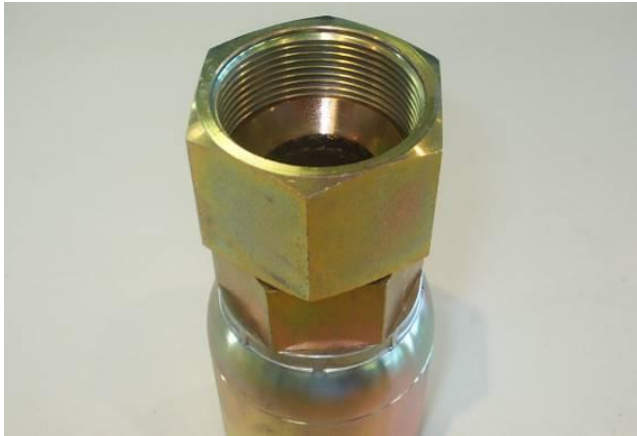


Figure 8 JIC HYDRAULIC FITTING



Figure 9 SAFETY WHIPCHECK



Figure 10 HYDRO BLAST HOSE RESTRAINT

4.8. Inspection and Testing

4.8.1. Proof Pressure Testing

Where proof pressure testing is required, it must be conducted in accordance with Australian Standard AS1180.5 and ISO 7751.

4.8.2. Periodic

All Hoses must be inspected and proof pressure tested at a period not exceeding those given in the below table. All periodic inspection and testing must only be completed by an Approved Supplier. An Approved Supplier must only perform inspection and testing of hoses within the scope indicated on the Approved Supplier Register. Periodic inspections must be documented, with the results of each test updated on the Hose Register.

Hose Type	Interval	Design Working Pressure
Plant Air	12 Months	1000 kPa
Process Water	12 Months	1750 kPa
Steam	6 Months	Refer to Engineering
Fuel / Oil / Hydraulic	12 Months	Refer to Engineering
High Pressure Water Blasting	3 Months	Refer to Engineering
High Pressure Jacking	12 Months	Refer to Engineering
Self-Store Air Hose	12 Months	700 kPa

4.8.3. Prior to Use Inspections

Prior to use all hoses must be checked for the following items, where an issue is identified, the hose must be taken out of service until the issue is resolved:

Stainless steel tag attached:

- Hose Design Working Pressure is appropriate for the application
- Hose Design Temperature is appropriate for the application
- Hose Periodic inspection is current
- Presence of cuts, cracks or kinks
- Weakened clamps due to rust or corrosion
- Damaged connections
- Deformity and
- Any other visible sign of damage.

4.8.4. WhipChecks

Whipchecks are required for hoses with diameter $\geq 25\text{mm}$ and operating pressure $\geq 760\text{ kPa}$ / 110psi). They must be constructed of woven stainless steel, galvanised steel wire rope, chain or similar material. Where a hose is fitted with an internal whipcheck, this does not negate the need to also fit external whipcheck. They must have a 'Strength Rating Certificate' obtained from the manufacturer / supplier.