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HARD SUCTION CONNECTIONS

PURPOSE

To provide guidance to hydraulic consultants and building designers for fire safety systems that incorporate hard suction connections. Hard suction connections and associated limitations are defined to ensure installations can meet Department of Fire and Emergency Services (DFES) operational requirements. This information should be read in conjunction with Australian Standard 2419.1:2005 Fire hydrant installations, Part 1: System design, installation and commissioning (AS2419.1).

INTRODUCTION

Fire safety systems require hard suction connections to access water supplies, which cannot be provided directly from water mains at sufficient flow and pressures to meet the requirements of AS2419.1.

Hard suction connections must meet the requirements of AS2419.1 and specifications outlined within this guideline, to be considered compatible with DFES equipment and operational procedures.

COMMENT

Hard suction connections are required to be installed on all fire water storage tanks. However, exceptions may apply and DFES should be consulted as required. For example:

- i) Within the Perth CBD where two parallel water mains may meet the minimum flow and pressures, or
- ii) Where break tanks are installed and the water supply is fed from a compliant reticulated water main capable of maintaining the required residual pressure. Please refer to DFES Technical Note 02/14 for more information in regards to reticulated mains.

Hard suction connections may also be installed to access water supplies such as dams, river or reservoirs where certain conditions have been met. Refer DFES Guidelines GL06 Acceptable water supply for hydrant and fire sprinkler systems.

Note: *Hard suction connections are not to be connected directly to the fire pumps or water mains.*

1. HARD SUCTION CONNECTIONS

1.1 Large bore suction connection

To meet DFES operational requirements, a large bore suction connection (as referenced by AS2419.1 Clause 5.4.2) is defined as a 125mm storz coupling (storz connection). Refer figure 1.1. The storz coupling is to be fitted with a storz end cap and chain.



Figure 1.1. Typical 125mm Storz coupling

IMPORTANT SAFETY NOTE:

A bleed device or drilled hole (8-10mm diameter) must always be provided within the storz end cap to ensure a build-up of stored pressure cannot occur.

1.2 Small bore suction connection

To meet DFES operational requirements, a small bore suction connection (as referenced by AS2419.1 Clause 5.4.3) is defined as a 100mm male Camlock coupling (Camlock connection). Refer figure 1.2.



Figure 1.2. Typical 125mm Storz coupling with 100mm male Camlock coupling

1.3 Country and rural urban interface regions

Country and rural urban interface regions may utilise a variety of fire appliances when responding to an emergency event. Compatible hard suction connections should be provided to meet the various fire appliance specifications of the region. Table 1.3 provides guidance for minimum hard suction specifications.

Region	Minimum hard suction specification
Perth metropolitan	1 x large bore suction
Rural urban interface	1 x large bore suction and 2 x small bore suction
Rural	1 x large bore suction and 2 x small bore suction

Table 1.3. Guidance for minimum hard suction specifications.

The draught capabilities of fire appliances available to service regional areas should be investigated prior to finalising hydraulic drawings incorporating a hard suction connection.

Note: All hard suction specifications are to be confirmed with DFES Built Environment Branch before proceeding with final hydraulic specifications of the fire safety system and to determine region.

1.4 Height of hard suction connections

Storz connections are to be installed at a height of no less than 450mm, and no more than 600mm, from the ground to the centreline of the Storz connection. The Camlock connections are to be 400mm above the storz connection but no more than 1000mm above ground level. Refer figure 1.4.

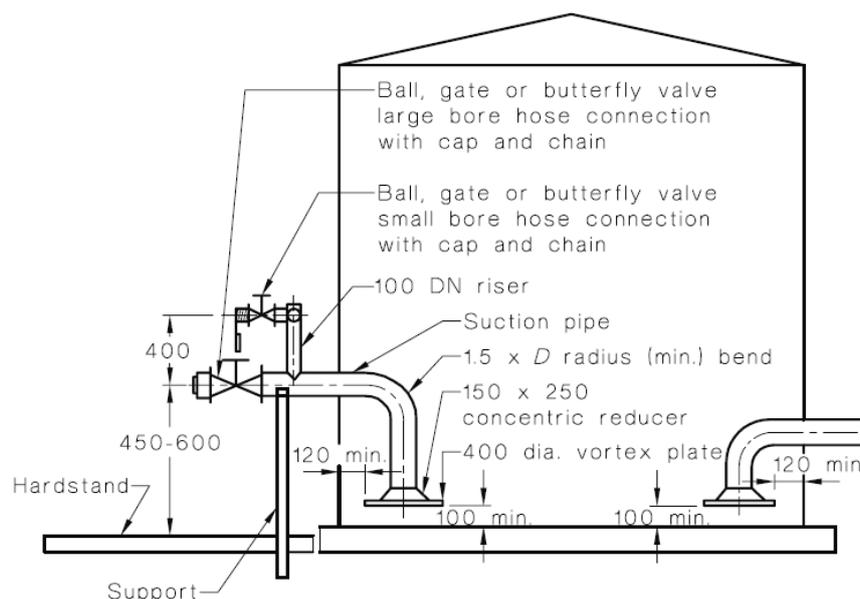


Figure 1.4. Heights of hard suction connections – Source AS2419.1:2005 Figure 5.4.2 (in part)

1.5 Hard suction connection clearances

The clearance around the Storz & Camlock connection handles is to be no less than 100mm on all sides to facilitate hose coupling. Refer figure 1.5.

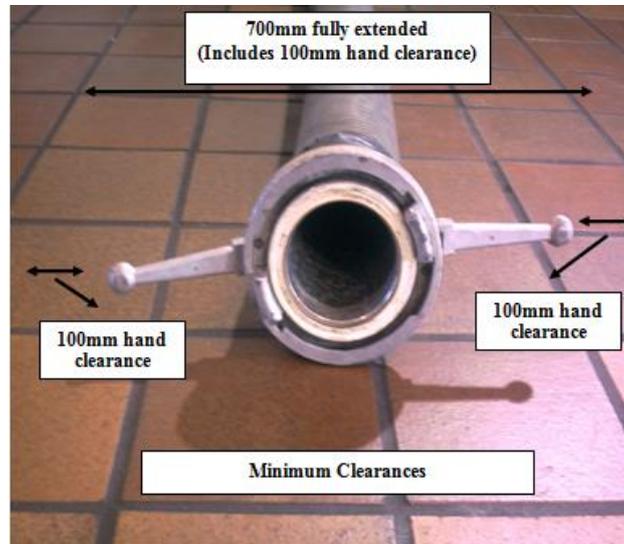


Figure 1.5. Minimum storz clearances

1.6 Isolation valves

An isolation valve must be installed directly upstream of all hard suction connections. They should be readily accessible by fire-fighting personnel. Isolation valves must be capable of providing unhindered operation.

Isolation valves to a Storz connection should be 'full flow' outside screw and yoke wheel gate valves of the indicating type (refer figure 1.6) and in accordance with AS2419.1 Clause 8.5.8 and 5.4.2.

Isolation valves to a Camlock connection can consist either a lever operated ball or butterfly valve, or a gate valve.



Figure 1.6 Typical isolation valve for a storz connection meeting AS2419.1:2005 requirements.

1.7 Suction hoses

Suction hoses provide a connection between the hard suction connection and the fire appliance. Suction hoses are generally considered rigid and inflexible, necessitating careful consideration of the hardstanding requirements for hard suction connections. Refer figure 1.7a and figure 1.7b.



Figure1.7a. Typical Storz suction hose (black)



Figure 1.7a. Typical Camlock suction hose.

1.8 Cabinet or Enclosure:

Cabinets or enclosures shall contain only fire-fighting equipment (booster assembly) and must be of weather proof and anti-vandal construction. The cabinet or enclosure is to be accessed via a square taper (budget key) locking device and sited in accordance with AS2419.1 Clause 7.3. Where required, FRL protection must be provided to the booster assembly.

Note: Where building design or site restrictions may affect fire fighter access to the booster assembly or hard suction location, early discussions should be undertaken with DFES to address operational requirements.

1.9 Connection clearance from the face of cabinets or enclosures:

The face of the hard suction connections shall be not more than 150mm from inside the front edge of the cabinet, or the front plane of any recess.

1.10 Identification of hard suction connections

A booster assembly containing a hard suction connection is to be identified with the appropriate signage on the front of the booster assembly. Signage is to meet the following requirements:

- Text to state, “HARD SUCTION CONNECTION”
- Text height 50mm
- Text to be high contrast with background.



Figure 1.10b. Typical signage to a booster assembly containing a hard suction

Further signage guidance can be obtained from DFES Guideline GL03 Fire Safety Signage.

1.11 Satellite hard suction connections.

Site constraints, hardstanding requirements and other factors may preclude the inclusion of the hard suction connection within the booster assembly. Where this cannot be practicably achieved and all other options have been explored, DFES Built Environment Branch may approve a satellite hard suction connection. A satellite storz connection must meet the following requirements:

- Enclosed and secured within a cabinet
- The cabinet must be R13 Signal red and readily identifiable
- The cabinet must be signed “HARD SUCTION CONNECTION”
- Accommodate a hardstand within 4.5 metres of the storz connection
- Associated fire system inlets must be within 8m of the nominated hardstanding area.

1.12 Multiple hard suction connection arrangements

Where the total water flow required exceeds 40L/s a second hard suction connection will be required. Each hard suction connection should be designed to incorporate independent pipework from the water supply. Multiple hard suction connections should not be designed in a 'series' arrangement.

Multiple hard suction arrangements may also require consideration of DFES Technical Note 04/16 Boosting combined Fire Hydrant / Sprinkler Mains.

1.13 Hard suction connections to break tanks

Hard suction connections incorporating 'break tanks' or 'reduced capacity' tanks into the design should be arranged to ensure water gauges are visible to the fire appliance pumper. Where this requirement cannot be accommodated, additional water level indicators should be provided within the booster assembly or at the hard suction connection locality. Refer DFES Technical Note 03/15 Digital Water Level Gauge for further information in this regard.

1.14 Hard suction connections to a water supply other than tanks

Special considerations are required where the water supply is provided from a water supply other than within a tank. Further guidance is provided within DFES Guidelines GL06 Acceptable sources of water supply for hydrant and fire sprinkler systems (bore, dams, rivers, lakes and seawater).

2.0 HARD SUCTION HARDSTAND REQUIREMENTS

The distance between the hard suction connection and vehicle hardstand is to be no more than 4.5m from the pumping appliance. Refer figure 2.0. A hardstand area is a designated space solely for the purpose of a parked fire appliance and associated fire-fighting operations. The area between the hard suction connection and hardstand should be level and of all-weather construction. Hardstands with gradients greater than 1:15 are not considered to meet DFES operational requirements.

Where the potential exists for a nominated hardstand area to be used by others or for others purposes, the area should be clearly demarcated to ensure the area remains clear at all times for fire-fighting purposes only.

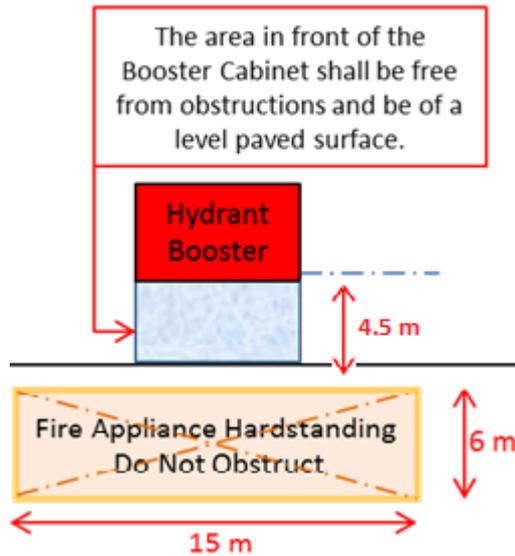


Figure 2.0. Typical hardstand.

Refer DFES Guidelines GL11 Site planning and fire appliance specifications for further guidance relating to hardstand requirements, inclusive of overhead and lateral clearances and other hardstand constraints.

Note: *Hard suction connections and associated hardstand areas should not be located on, or compromise the required Perimeter Vehicle Access (PVA) of large isolated buildings.*

2.1 Landscape considerations

The area directly between the hard suction connection and nominated hardstand area should be free of any obstructions. This area should be considered trafficable. Where this area traverse a road reserve or verge areas, all potential sources of obstructions should be carefully reviewed. Sources of potential hard suction obstructions include, but are not limited to:

- Nominated street parking bays
- Verge treatment
- Verge trees
- Electrical poles
- High voltage electrical distribution equipment
- Overhead façade treatments

2.2 Multiple hard suction connection hardstand requirements

Multiple booster assemblies that incorporate a hard suction connection and tandem hardstand arrangements are required to be separated by a minimum of 10 metres. This distance must be measured from the midpoint of the hard suction connections within each assembly.

Note: DFES pumping appliances are generally configured with transverse mounted (side mounted) centrifugal pumps. The minimum separation, allows for two side mounted pumping appliances, parked in tandem, to deploy delivery and suction hoses separately when setting up individual boosting operations.

3.0 ADDITIONAL DFES OPERATIONAL CONSIDERATIONS

3.1 Effective suction lift

Hard suction connections with a remote water source, should be designed with consideration of a maximum practical lift of three (3) metres. The maximum practical lift should be measured from the effective capacity or low water mark, to the eye of the fire appliance pump. Refer figure 3.1.

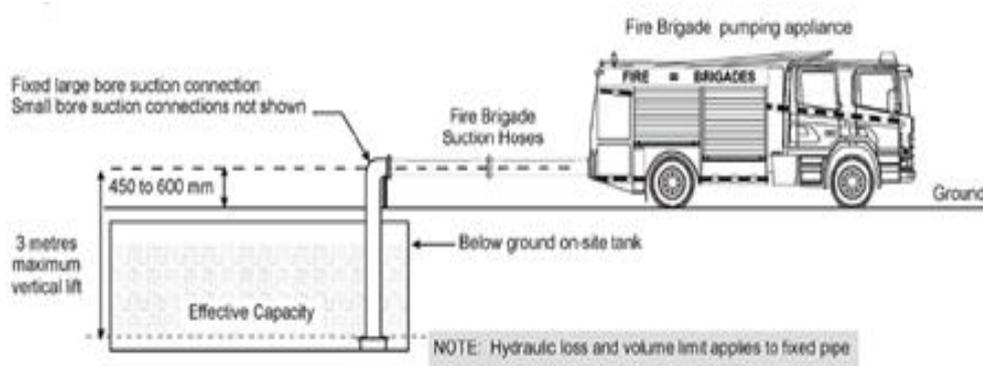


Figure 3.1 Effective suction lift not to exceed three metres.

3.2 Maximum pressure to hard suction connections

The maximum pressure, at the hard suction connection shall not exceed 150kPa when supplied by tanks installed on upper floors of a building or an elevated water supply.

3.3 Priming line

Where hydraulically required, DFES will consider the installation of a priming line where the following requirements are met:

- The priming line will be a maximum of 25mm in diameter
- Installation of a backflow prevention device to the priming line
- The priming line can be isolated from within the booster cabinet by the operation of a ball /butterfly valve.
- The priming line shall not exceed a maximum static pressure of 150kPa.

The intent of the priming line is not to act as a water source to the hard suction connection but to prime the draught line with water to the underside of the required isolation valve installed.

3.3 Excessive distances or bends between the hard suction connection and water supply

Designs incorporating excessive distances or pipework bends between the water source and the hard suction connection have regularly been observed to fail or not operate as designed. Systems designed within marginal hydraulic limits, may not account for the practical installation completed. To ensure the reliability of the water supply and the system being capable of operating as designed, DFES recommends all systems incorporating a hard suction connection be designed, with minimal pipework bends and distances between the water supply and hard suction connection.

3.4 Blockplan

Where a hard suction forms part of the booster assembly, additional information to the requirements of AS2419.1 Clause 7.11, is to be included on the blockplan:

- The effective capacity (litres) of pump suction tank/s or alternative water supply (dam, lake etc) is to be noted on the hydrant block plan or on a separate sign as appropriate.
- The calculated effective suction height from the water source to the eye of the fire appliance pump.

SUMMARY REQUIREMENTS FOR HARD SUCTION CONNECTIONS:

1. *Minimum and maximum installation heights and clearances for hard suction connections (125mm Storz & 100mm Camlock).*
2. *Cabinets and enclosures to be of sufficient size to house all equipment with suitable clearances.*
3. *Appropriate signage to all hard suction connections*
4. *Emergency vehicle access to comply with DFES hardstand requirements.*
5. *Approved isolation valves to be provided to AS 2419.1 requirements.*
6. *Break tanks require a water level indicator to be visible to the pump operator.*
7. *Special consideration for systems involving two or more suction connections.*
8. *Maximum lift for suction connections to be no more than 3m height.*
9. ***Final specifications to be determined by DFES according to site conditions.***
10. *Suction connections must not be pressurised by fire pumps or water mains.*
11. *Maximum hard suction hose pressure to be no greater than 1.5bar.*
12. *For safety, a bleed hole (8-10mm) MUST be provided within the Storz end cap assembly.*

REFERENCED GUIDELINES AND TECHNICAL NOTES

DFES Guidelines GL03 Fire Safety Equipment Signage
DFES Guidelines GL06 Acceptable sources of water supply for hydrant and fire sprinkler systems (bore, dams, rivers, lakes and seawater)
DFES Guidelines GL11 Site planning and fire appliance specifications
DFES Technical Note 02/14 Reticulated water supply
DFES Technical Note 04/16 Boosting combined Fire Hydrant / Sprinkler Mains.
DFES Technical Note 03/15 Digital Water Level Gauge

REFERENCED STANDARDS

AS2419.1:2005, Fire hydrant installations – Part 1: System design, installation and commissioning
AS2118.1:1999, Automatic fire sprinkler systems – Part 1: General requirements
AS2118.6:2012, Automatic fire sprinkler systems – Part 6: Combined sprinkler and hydrant systems in multistorey buildings
AS3735:2001, Concrete structures retaining liquids
AS2304:2011, Water storage tanks for fire protection systems

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