= Hard suction hose =

Hard suction hose (alternatively , suction hose) is a specific type of fire hose used in drafting operations , when a fire engine uses a vacuum to draw water from a portable water tank , pool , or other static water source . It is built to withstand vacuum , rather than pressure , abrasion , and heat . In the United States , it is standard equipment according to the National Fire Protection Association standards for fire engines . It is used in both structural and wildland firefighting throughout the world , and is made in various diameters and connection types .

= = Usage = =

Hard suction hose , also known as a suction hose , is a specific type of rigid fire hose used in drafting operations . When using this technique , the fire engine draws water for fire fighting from an unpressurized supply , such as a portable water tank , pool , or other static water source , instead of drawing water from a pressurized water supply , such as a fire hydrant . Under complete vacuum conditions , a pump would lift water 33 @.@ 9 feet (10 @.@ 3 m) , however pumps on fire apparatus are not capable of producing a high vacuum . Due to this limitation and friction loss , fire services do not recommend attempting to lift water more than 3 metres (9 @.@ 8 ft) .

Hard suction hose may also be used to connect a fire engine to a hydrant . This practice is common in Australia , but woven jacket fire hose is normally used for this purpose in the United States . Using hard suction hose in this manner requires that the fire engine be positioned carefully for the limited flexibility of the hose , and may require multiple firefighters due to the weight and bulk of the hose section . In certain circumstances , it may be possible to use hard suction hose to draft from a hydrant with adequate water supply but a low flow rate .

These hoses are built to withstand vacuum , rather than water pressure , abrasion , and heat . They are , therefore , constructed differently from the standard fire hose and have different end fittings . In the United States , they are standard equipment according to the National Fire Protection Association standards for fire engines . Since hard suction hose cannot be folded , it is typically mounted on the side of a fire engine , often opposite ground ladders . Such hose is used in both structural and wildland firefighting throughout the world .

Hard suction hose can also be used to extend the range of a water tender 's dumping capability , if the fittings of the hard suction hose match those of the tender dumping water . This could be used to fill a portable dump tank not immediately adjacent to the water tender , from which another fire engine can draft . Since water movement during dumping relies on gravity , rather than mechanical pressurization , hard suction hose is useful for this task .

= = Characteristics and construction = =

Hard suction hose differs from standard fire hose in both its construction and usage :

It is rigid and generally scalloped . Often , such hose is manufactured using molded synthetic material (such as PVC) shaped into a series of rings . This shape allows the hose to be somewhat flexible , without allowing it to collapse in on itself under suction , as a normal , woven @-@ jacket fire hose would .

It uses suction gaskets . Gaskets in standard fire hose (" pressure gaskets ") are designed to minimize the water leaking out between couplings . The gaskets connecting hard suction hose sections , pump , and strainer must instead prevent air from entering at the coupling , since that would spoil the vacuum and allow air into the pump intake . Large diameter (4 @-@ inch (10 cm) or greater) hard suction hose will typically use Storz fittings , which are genderless . 3 @-@ inch (7 @.@ 6 cm) or smaller hard suction hose will typically use threaded fittings . In each case , the hard suction hose connection will match the fittings of the pump intake and supply hose , so that hard suction hose can be used in place of supply hose as appropriate .

It is short . Typically , hard suction hose comes in 10 feet (3 @.@ 0 m) lengths , while fire hose comes in 50 and 100 feet (15 and 30 m) lengths . Since a fire engine 's pump only produces a

partial vacuum , it is only recommended for lifting water 3 metres (9 @.@ 8 ft) or less . For this reason , and because each junction is an opportunity for a crack or imperfect seal to spoil the vacuum , it is rare to see many sections of hard suction hose connected together .

It is not designed for use in fire streams . The airtight nature of hard suction hose , necessary for drafting , renders the hose unsuitable for the high pressure water flow needed to spray a pressurized stream of water on a fire . Thus , hard suction hose is tested for the ability to " prevent collapse under vacuum conditions " rather than its ability to function as an attack hoseline .

Hard suction hose predates steam or gas powered fire engines and has been available since at least 1888 , sometimes referred to as " spiral suction hose " .

= = Diameter = =

Hard suction hose comes in multiple sizes , from 2 to 6 inches (5 @.@ 1 to 15 @.@ 2 cm) in diameter . Large diameter hose are carried on full @-@ size fire engines , but smaller diameters of hard suction hose can be carried on apparatus with smaller fire pump ratings , such as wildland fire engines . In the United States , NFPA 1901 requires engines to have hard suction hose that matches the engine 's pump rating . For example , an engine with a 1 @,@ 000 @-@ US @-@ gallon (3 @,@ 800 l) per minute pump is required to carry 5 @-@ inch (13 cm) or larger hose , while a wildland fire engine will typically carry 2 @-@ to @-@ 2 @.@ 5 @-@ inch (5 @.@ 1 to 6 @.@ 4 cm) hard suction hose .

The United Kingdom , has a standardised range of metric hose diameters : 7 , 9 , 12 @.@ 5 and 15 cm (2 @.@ 8 , 3 @.@ 5 , 4 @.@ 9 and 5 @.@ 9 in) , with the two smallest diameters sometimes used twined to provide adequate flow rates . Within this range , the 7 centimetres (2 @.@ 8 in) hoses are fitted with " Instantaneous Couplings " ; the 12 @.@ 5 and 15 centimetres (4 @.@ 9 and 5 @.@ 9 in) hoses have Storz couplings ; and the 9 centimetres (3 @.@ 5 in) hose comes in two types , one with " Instantaneous Couplings " and one with Storz fittings . Fire Service Manuals provide tables of maximum volumetric flow rates for a given pump pressure , hose diameter and total hose length . The use of these tables , is to facilitate the selection of suitable hoses , taking into account the frictional losses caused by transporting water through the strainer , hoses , pump and fire fighting nozzles , to draft water from source to the fireground .

= = Strainers = =

When being used in a drafting operation from a pool , portable water tank , or other uncovered water source , the length of hard suction hose farthest from the pump is usually attached to a strainer , to keep foreign objects in the water from being pulled into and damaging the pump . If used in a pond , stream , or other body of water , an appropriate flotation device must be used to keep the strainer below the surface and above the bottom , so that neither mud nor air are sucked into the fire engine 's pump . When drafting from a solid @-@ bottomed tank or pool , a strainer can safely rest on the bottom without suctioning mud into the fire engine 's pump .

The United Kingdom official guidance is to :

use ropes to take to the weight of the hose and the strainer , in order to avoid putting sideways loadings on the couplings ;

ensure that the strainer is a minimum of three strainer @-@ diameters below the water surface to prevent air cavitation ;

to support the hose with packing , where necessary , when it crosses a wall or other obstruction to prevent an air pocket being formed .