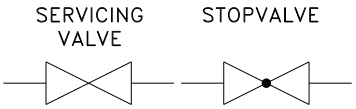
Water Regulations Tutorial # 9
Isolating Valves

Updated 06/01/14

The new Water Regulations are less prescriptive than the old Byelaws. Previously, valves had to be designed, manufactured and used in accordance with a specific British Standard. This approach stifled innovation and was considered a barrier to free trade – where many technically superior European valves were unacceptable.



Valve Symbols

The Water Regulations are based on a performance specification, where the fitting is acceptable if it meets the requirements of the Regulator's test criteria or conforms to at least one of the alternative routes stated in Regulation 4(2). Spherical – AKA "Ball" valves - are acceptable for most applications.

STOPVALVES

The official interpretation in Schedule 2 is less than helpful and basically states a stopvalve is a valve that stops water! The Water Regulations Guide refers to a stopvalve being used in two places – namely externally and internally on the service pipe from the water company's main. The symbol for a stopvalve includes a dot in the centre.

The external stopvalve is normally provided and maintained by the water company. Schedule 2 paragraph 10 states –

1. *"Every supply pipe or distributing pipe providing water to separate premises shall be fitted with a stopvalve conveniently located to enable the supply to those premises to be shut off without shutting of the supply to any other premises.*
2. *Where a supply pipe or distributing pipe provides water in common to two or more premises, it shall be fitted with a stopvalve to which each occupier of those premises has access."*

The government guidance clause G10.3 rewords the legal clause -


BV209 with compression ends

G10.3
"Every supply and distributing pipe providing water to premises should be fitted with a stopvalve to control the supply to those premises only."

G10.4
"Every supply and distributing pipe providing water in common to two or more premises is to be fitted with a stopvalve (whether inside or outside premises) to which the occupier of the premises has access.

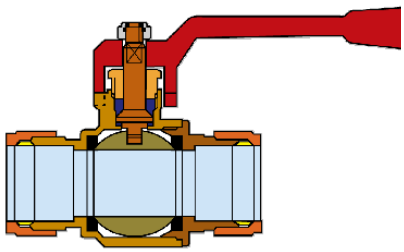
Note: Whole site backflow protection in accordance with Clause G15.24 should be provided to each separately occupied premises."

Under the old Byelaws, the "stopvalve" to a property was normally to BS1010 or BS5433. These are of the screw down type (with rising headworks), which incorporate a rubber washer. The new Regulations no longer specify a type of valve and spherical "Ball" valves may be used. R2.8 states that any valve may be used providing it confirms to an appropriate British Standard (e.g. BSI Kitemarked), or appropriate European standard, or the Regulator's specification (e.g. WRAS / KIWA UK) and it is suitable for the purpose.

G2.8 makes it clear that **spherical valves may be used for above and below ground applications**. Indeed the valves supplied by the water company in the meter box are normally spherical.

G2.7 states stopvalves, servicing valves and drain taps "… *do not incorporate a loose washer plate".* The reasons are not explained but are likely to be over concerns of unwanted non-return characteristics - where expansion from a water heater is acceptable for example. Loose washer plates have also been known to vibrate causing unwanted noise.

SPHERICAL VALVES



BV209 section - showing serviceable PTFE spindle seal

Spherical valves are not generally serviceable. 2-port valves normally have two PTFE conical seals and a spindle seal. Some *economy* ball valves have only one proper seat. These are uni-directional and the direction arrow must be observed.

The spindle seal often has an O-ring - *the spindle is also known as a stem*. Alternatively, the spindle may incorporate a PTFE seal and an adjustable gland nut – see BV209 section. The nut can be tightened to stop a leak or the seal may be replaced in-situ without removing the valve from the pipe. Many local authorities insist on serviceable spindles. Furthermore, PTFE can cope with high temperatures and tolerate a wide range of fluids - including oils. EPDM O-rings by contrast are generally limited to a service temperature of 85^{O} C and must not be used for oils. Arrow Valves Ball Valve model BV209 incorporates a serviceable PTFE spindle seal.

The principle of a spherical valve should be likened to a bath plug in a hole. The ball invariably is free to float and differential pressure forces the ball against the conical PTFE seat behind the ball. At high differential pressure, a gap may develop between the front seal and the ball and therefore the spindle seal is essential for containment. The spindle seal becomes critical when the ball is partially open; where the fluid enters the cavity behind the ball.

Some main seal designs incorporate O-ring backed PTFE seals or specially shaped seals, which assist the upstream seal to remain in contact with the ball. This is particularly desirable for 3-port valves.

G2.7 does **not** require spherical valves to have renewable seals.

MERITS OF SPHERICAL VALVES

Spherical valves have been used for over forty years for small valves (e.g. 15 mm "Ballo-fix"). European manufacturers have increased the size and design range and now there are literally hundreds of valves available.

The Main Benefits of Spherical Valves	Limitations of Spherical Valves
Full–bore – virtually no headloss	Trapped cavity – expansion (ice or very hot water/stream) can split body – use vented ball design
One valve suitable for wide range of fluids – water, oil, steam (check manufacturer's specification)	Main seals generally not replaceable. Flat-faced valves (BV350) facilitate valve replacement
Long service life – PTFE outlasts rubber washers	Partially open valve allows bypass round any strainer or non-return valve
Reliable seal – tolerates minor debris	Can cause water hammer – geared handle reduces this
Modular – ball can incorporate a flow limiting cartridge or strainer	
Quick operation	
Huge range	
Low cost	

MODULAR SPHERICAL VALVES

An ingenious development of the spherical valve involves a component to be installed in the centre of the ball. Providing a side port allows access to the component in the centre of the ball without having to remove the valve from the pipe. Furthermore, both inlet and outlet ports are isolated in the closed position. This method is used for the Arrow Valves Automatic Flow Limiting Valve model AFL, which can incorporate one of eight flow limiting cartridges. The cartridges can also incorporate a strainer.

Automatic Flow Limiting (AFL) Valve. Servicing Valve with flow limiting cartridge. Arrow Valves AFLs have a lever and colour coded-coded identity disc indicating the flow rate of the cartridge inside

*There are 8 colour-coded AFL cartridges that fit into valve **in-situ**. Cartridge fits into centre of ball via side port – **no need to isolate or drain supply**. Pliers can be used to remove cartridge. A cartridge can be fitted or changed in less than a minute*

It should be noted that a partially open spherical valve could allow the flow to bypass the component in the ball centre since the flow can go behind the ball. For this reason, spherical valves with a one-way valve are known as "non-return" valves and not "check". The term "check" in the context of the Water Regulations refers to backflow prevention. Spherical valve, such as the "Ballstop" must not be used as a single check valve against backflow but may be used for other non-return applications including – pump outlets.

SPHERICAL VALVES IN EXTREME TEMPERATURES

In the closed position, fluid is often trapped in the centre and behind the ball. If the fluid is water, this will start to expand below 4^{O}C, with significant expansion during freezing, fracturing the valve body. Clause G11.5 suggests spherical drain taps should not be located in areas prone to frost. The Water Supply Industry clause R11.5 suggests that if spherical valves are used, the tap should be left open after draining. Arrow Valves suggest leaving the valve half open (45 degrees) in these circumstances, thereby allowing the fluid to drain both from the ball centre and the cavity between the ball and body.

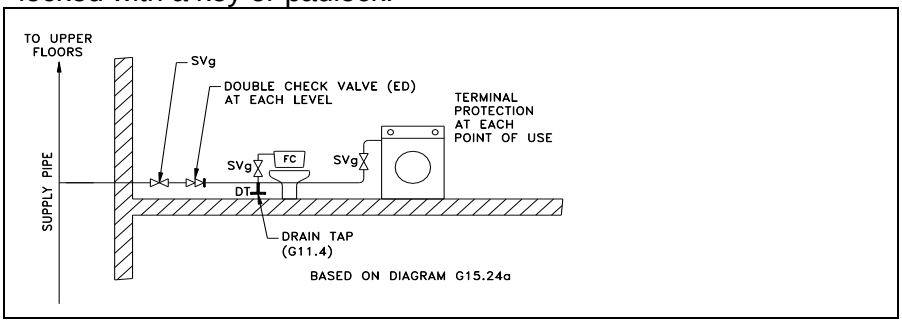
Clearly the same potential problem of frost damage is applicable to spherical valve hose union taps. A hose union bib tap to BS1010 part 2 (Kitemarked) is generally a better solution, as used in our Standpipe model SPED. Remember, do not use taps with integral Double Check Valve - *refer to tutorial 2*.

*Filterball with flat-faced solder unions. This serves as an isolating valve with integral strainer. 700 micron strainer. The strainer may be removed **in-situ**. Strainer fits into centre of ball via side port – **no need to isolate or drain supply***

LEVERS

The byelaws required servicing valves to a WC float valve to have a screwdriver slot rather than a lever. The Water Regulations no longer state this and levers may be used.

Some levers feature two slots enabling the valve to be locked in the fully open or closed position – the handle must be removed to achieve this. Alternatively we can supply valves that can be locked with a key or padlock.



SERVICING VALVES

An isolating valve, not being a stopvalve, is described as a "servicing" valve (SgV).

Many WC cisterns now have an internal overflow, which discharges down the pan. The acceptance is conditional upon measures to reduce the likelihood of the internal overflow being used. A strainer should be incorporated or fitted upstream of the float valve. Clearly it is desirable to have a strainer that can be cleaned without dismantling the valve or pipe. The AFL Valve with a 180 micron strainer is ideal, since this also complies with the requirement for a servicing valve - Schedule 2, paragraph 16 (2).

DRAIN TAPS

The Water Regulations use the term "Draining Tap" or "Drain Tap", which may be abbreviated on a drawing as "DT". The term Drain Cock is no longer used. G11.4 requires a "sufficient" draining tap to drain all supply and distributing pipes. R11.4 requires the drain tap to be accessible. G11.5 states *"draining taps should be of the screwdown type conforming to BS 2879 or, where located in a frost free location, of an approved **spherical** type".*

SECONDARY BACKFLOW PROTECTION

Clause G10.4 – see above - primarily dealt with the need for stopvalves. However it also made reference to backflow prevention with Clause G15.24.

G15.24 "Whole-site or zone backflow prevention device should be provided on the supply or distributing pipe, such as a single check valve or double check valve, or other no less effective backflow prevention device, according to the level of risk as judged by the water undertaker where:

a. a supply or distributing pipe conveys water to two or more separately occupied premises (whether or not they are separately chargeable by the water supplier for a supply of water); or,

b. a supply pipe conveys water to premises which under any enactment are required to provide a storage cistern capable of holding sufficient water for not less than 24 hours ordinary use. See Figure 6.2b."

Water Industry Clause R15.24.1 deals with secondary backflow prevention on the main supply pipes and distribution pipe serving several dwelling units such as in a block of flats where contaminated water might pass from one flat to another. The requirement also applies to industrial premises, schools, offices, hospitals etc. R15.24.3 continues, and recommends secondary protection be installed at every floor level as indicated (see drawing). The clause states that where backflow risk does not exceed Fluid Category 3, the acceptable protection devices would consist of **double check valve assemblies installed immediately downstream of the stopvalve on each branch supply pipe to the level or floor**. *(To read this full clause ver batum please refer to the Water Regulation Guide).*

Branch Valve – Full bore servicing valve; low headloss Double Check Valve and Drain Tap with flat-faced solder unions. Can also feature Pressure Reducing Valve and/or Water Meter

Remember, the legal requirement of providing appropriate **point of use protection** – schedule 2 paragraph 15 and –

G15.25 "The provision of zone or whole-site backflow protection should be in addition to individual requirements at points of use and within the system."

BRANCH VALVE

The Branch Valve model BRV has been designed specifically to comply with the new Water Regulations. The assembly consists of a full-bore servicing/stopvalve and low headloss Double Check Valve. Flat-faced connectors allow direct connection to the pipe without the need for sealants or additional adapters.

Normally solder unions – more reliable than compression - are used but connections for any pipe materials are available.

Flat-faced union connectors with EPDM washers allow valve to be easily installed to new or existing pipes without the need to spring pipes apart. The unions enable the handle and drain tap to be aligned and the assembly is demountable.

Oversize, high-flow cartridges provide exceptionally low head-loss characteristics – *see model ED132.*

The Branch Valve can be installed horizontally or vertically. As a modular design, additional components can be added at the factory, such as a strainer (model BRFB - see Filterball model FB), Pressure Reducing Valve (model BRPRV - see model PRV536 and model PRV1300) and secondary water meters (model BRM). Model BRPRMV includes both PRV and meter.

SUMMARY

1. Spherical "Ball" valves can be used as stopvalves.
2. The use of WCs with an internal overflow is conditional upon the compact float valve having a strainer (R25.6) – e.g. AFL servicing valve with serviceable 180 micron strainer.
3. Flat-faced valves with solder unions are inherently more reliable than valves with compression joints.
4. Clause R15.24.3 requires a servicing and Double Check Valve to be installed at every floor in a building.
5. Clause G15.24 requires separately occupied premises (e.g. flats) to have a Double Check Valve.

Thank you for your interest