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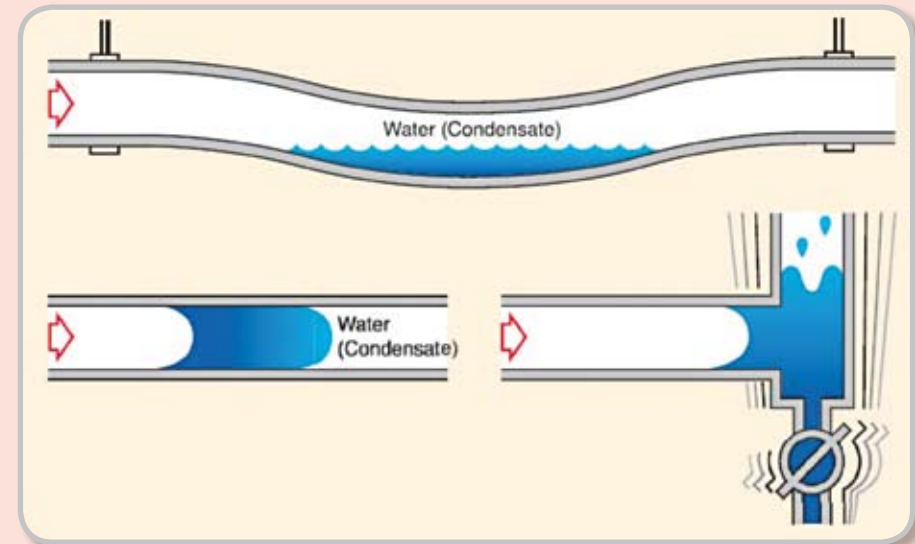
Spirax Sarco Customer Experience Improvement

Spirax Sarco Customer Experience Improvement is a channel for **YOU**, our valued customer, to share your views on your experience in partnering us. We welcome views on any facet of our business.

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Water Hammer – How much do you know?

As soon as steam leaves the boiler, condensation takes place in the pipe due to heat loss. This situation is even more intense during the initial supply of steam and when the system is cold.

Fig. 1 demonstrates how tiny droplets of condensate can build up with increasing length of the pipe and eventually, it becomes a mass of liquid (Solid Slug) carried along at high speed.

When the slug encounters any obstacle such as a change in the pipe direction, it will stop immediately. The kinetic energy of the high speed condensate is suddenly converted into pressure energy which has to be absorbed by the pipework. If the speed is very high or there is a lot of weight, the amount of energy output may be strong enough to crack pipes and rupture the fittings. Even if there is not much speed and weight, the noise created in the system by the impact can be a severe nuisance.

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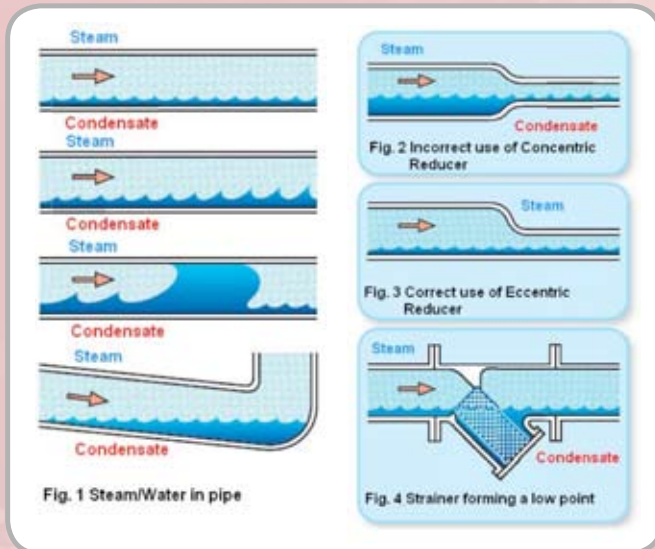
The incidence of water hammer will be encouraged if pockets of condensate are allowed to build up in low points of the steam system. Common sources of trouble are sags in the pipework and incorrect use of concentric reducers as shown in Fig 2. If the eccentric reducer is installed correctly as shown in Fig. 3, collection of condensate will not be allowed. Even a strainer fitted as in Fig. 4 is a potential cause of water hammer. It is better to fit strainers on their sides in steam lines and will prevent the formation of condensate which can be picked up by fast moving steam.

To reduce the possibility of water hammer, steam lines should be arranged with a gradual fall in the direction of flow and drain points installed at regular intervals and at all low points. Check valves should be fitted after any traps which would otherwise allow condensate to run back into the steam line or equipment during shut down.

Water hammer can occur in submerged steam heating coils commonly found in tanks and vats. Although the coils do not have the long uninterrupted lengths of steam mains or space heating pipes, incoming steam still can be condensed very quickly. This results in a large weight of water being carried forward by steam which has a fairly high speed due to the heavy condensation rate. If condensate is lifted to the trap, it is important that the coil falls continuously along its length and is fitted with a loop seal and small bore riser.

Difficulties arise when there is insufficient pressure available at the trap inlet if condensate has to be lifted after the steam trap. The equipment will then waterlog and water hammer may happen when the steam pressure builds up again. This is especially the case with equipment fitted with automatic temperature controls. The best arrangement in such cases is to drain the condensate by gravity to a vented receiver and use a pump to lift to a higher level.

It is recommended to fit steam traps which have a very strong resistance such as the thermodynamic or bucket types wherever there is a risk of water hammer.



Spirax Sarco Pharmaceutical and Biotechnology Training

For many years, Spirax Sarco has been conducting Steam and Condensate System training in our Singapore Training Centre. This training is conducted by our Technical & Training Manager, Mr. Chng Poh Beng and has been very popular especially with people that utilize steam in their daily operations.

Aside from possessing in-depth knowledge and expertise, Dave is also an eloquent speaker. Not only has Dave conducted training he had also previously spoken for the ISPE and IChemE on the topic of clean utilities and numerous in-house training sessions for multi-national pharmaceutical manufacturers.

Mr. Chng has been with Spirax for 20 years and has a wealth of knowledge and expertise which he has been teaching and sharing with many participants.

The Spirax Sarco training was conducted in 2 parts – with engineers coming from Australia, New Zealand, Indonesia and Philippines to attend this training as well as exchanging their personal experiences with each other.

Recently, Spirax had the opportunity to introduce an industry specific training course titled “Steam & Condensate System – Pharmaceutical & Biotechnology” .

The course covers the following topics:

- The fundamentals of steam
- The classifications of steam in the Pharmaceutical Industry
- Clean steam system & distribution principles
- The components of clean steam
- Steam consumption in Pharmaceutical process applications
- Effective condensate removal from sanitary heat exchangers
- Condensate Recovery
- Pressure Reduction
- Steam Quality Testing



Dave Forte
Market Development
Manager for
Pharmaceutical

It was a pleasure to have Dave Forte, our Pharmaceutical Technical Specialist from Spirax Sarco UK to join us and have a part in making this training a truly enjoyable and knowledgeable one. Dave is a Chartered Chemical Engineer and has worked in the Biopharmaceutical industry for over 10 years before joining Spirax Sarco. Dave brings with him a wealth of expertise and experience in the design, commissioning and qualification of clean utilities.

During the training, Dave shared his knowledge, experience and expertise of clean steam with the participants. Overall, it was a fruitful trip for the overseas participants and a valuable one for Spirax engineers and customers.

The next Spirax Sarco Steam and Condensate System training course will be conducted on 13 - 14 October 2011 and a second “Steam & Condensate System – Pharmaceutical & Biotechnology”. Training course will be held in April 2012.

For more details on the training course, please logon to www.spiraxsarco.com/sg or send your enquiries to poh-beng.chng@sg.spiraxsarco.com

Fig 34HP ASME Class 600 Strainer

The Fig34HP is an ASME Class 600 rated Carbon Steel Y-type Strainer designed to protect equipment from pipeline debris such as scale, rust, jointing compound, weld metal and other solids in flowing liquids or gases. It is important that strainers are fitted to protect hi-tech equipment such as steam traps, pumps, control valves and any other pipeline equipment to reduce the risk of damage or malfunction.

Spirax Sarco has now developed the Fig34HP ASME Class 600 rated Strainer which replaces the Fig1738.



Features	Benefits
<ul style="list-style-type: none"> • Pressure rating to ASME Class 600 	<ul style="list-style-type: none"> • Wider range of applications providing increased sales opportunities
<ul style="list-style-type: none"> • Large screening area 	<ul style="list-style-type: none"> • Low pressure drop and high Kv • The frequency of blowdown for cleaning the screen is considerably reduced
<ul style="list-style-type: none"> • Optional blowdown/drain valve 	<ul style="list-style-type: none"> • Ability to clean screen in service • Reduces system downtime
<ul style="list-style-type: none"> • Wide range of strainer screen options including Stainless Steel, Monel, perforations and mesh 	<ul style="list-style-type: none"> • Allows optimum selection for specific applications and type of fluid

VHT Vent Head

We are pleased to announce the release of a new range of VHT vent heads for feed tanks, condensate receivers, blowdown vessels and all other similar steam venting applications.

VHT vent heads are suitable for vertical open-ended steam vent pipes. The vent head is designed to safely discharge dry steam to atmosphere at low velocity, protecting personnel from injury, buildings from damage and minimizing the nuisance of water spray on the surroundings.

How does the VHT vent head works?

Spirax Sarco have designed and developed a new Toroidal Vent Head (VHT). Steam flow entering the vent head is directed over an internal disc and forced into a toroidal vortex, causing entrained water droplets to be flung outwards and 'wetting out' onto the internal surface of the vent head. As these droplets come together they are driven towards the internal drain by the 'downward' rotation of the toroidal vortex.



Design Features	Benefits
<ul style="list-style-type: none"> • Internal drain 	<ul style="list-style-type: none"> • Quicker installation, no external drain pipe work required. Recovery of separated condensate
<ul style="list-style-type: none"> • Toroidal vortex operation 	<ul style="list-style-type: none"> • Efficient separation of condensate
<ul style="list-style-type: none"> • No moving parts 	<ul style="list-style-type: none"> • Minimal maintenance
<ul style="list-style-type: none"> • Light weight 	<ul style="list-style-type: none"> • Easier and safer to install
<ul style="list-style-type: none"> • Stainless steel body 	<ul style="list-style-type: none"> • Life long, trouble free operation
<ul style="list-style-type: none"> • Swivel flange 	<ul style="list-style-type: none"> • Flange can be positioned independent of vent head body

Steam system AUDIT or SURVEY?

Many companies offer Steam System Surveys and undertake them with a fee or even free of charge. Is this what you are really after? It could be that you are looking to have a Steam System Audit to be conducted. The difference between the two is quite significant.



Steam System Survey

A steam survey is generally undertaken by a service engineer to report to the customer the condition of his/her steam system. To run a steam system safely and at peak operational efficiency, it is essential that all steam lines are cleared of condensate properly. The survey report will include where improvements can be made to increase the plants efficiency by:-

- changing the pipe work layout.
- Improving the general condition of pressure reducing valves.
- Identifying any process control issues.
- installation of condensate pumps to overcome heat exchanger problems
- and where the use of flash steam recovery systems can reduce steam usage

This may also include testing steam traps and reporting which failed and need repair. This is generally accompanied with a summary of:-

- fuel savings that can be gained
- and / or increased production that is possible
- quotation for capital equipment

Benefits of Steam System Survey

- Performance measures - gain an overview of system efficiency
- Flexibility - choose the surveys and services to match available budget and business objectives
- Simplifies investment decisions - justify improvements with an assessment of payback and benefits.

Steam System Audit

A steam system audit undertaken by Spirax Sarco's service department for a nominated fee is to:- Locate, Identify, Number, Tag and report on the condition of steam traps, pressure reducing valves, control valves and other associated steam control equipment. The audit gives a complete inventory of all steam control equipment in your plant and its condition.

The steam system audit conducted by Spirax Sarco includes:

- Inventory of key equipment
- Identification of poor engineering practices
- Health and safety issues
- Focus on energy savings through:
 - Heat recovery
 - Identification of steam leaks
 - Identification of misapplied or incorrectly sized equipment
 - Identification of failed steam traps
 - Utilization of flash steam
 - Return of condensate
 - Inspection of insulation

Audit is the basis for a preventative maintenance program to be put into place and regular audits are able to ensure that the plant is running at its optimum. Audits are also tailored to your process or application and your budget. They can include the complete steam distribution loop, right through to process applications and condensate return. The scope of the audit can be tailored to fit your needs, for instance it can be focused on energy efficiency, health & safety or best practice.

After the audit, you will receive a written report, dependent on the audit, typically covering:

- Inventory of equipment audited.
- Description of problems identified.
- Recommendations aimed at improving:
 - Energy / emission losses.
 - Steam generation and distribution.
 - Engineering practices / correct applications.
 - Health and safety.
 - Heat recovery / return of condensate.
- Potential savings (the cost of doing nothing) based on:
 - Energy savings.
 - Water / effluent costs.
 - Production losses (where information is made available) based on improved warm-up times and reduced downtime by ensuring steam reaches the point of use at the correct quantity, quality and pressure.

- Product rejects (where information is made available) resulting from steam /condensate problems.
 - Cost of implementing report recommendations.
 - Return on investment.
- So, do you need a survey or audit? It is important not to confuse the two.

If you need help with steam system survey/audit, please call our Spirax office for assistance!

APPLICATION Dear TC

Q Hot water temperature from a heat exchanger fluctuates from 77 to 83 deg C. This is causing problem for the process which requires the hot water at 80 ± 1°C. The float type steam trap draining the Heat Exchanger is sometimes very hot but at times "cool" enough to touch. Please advise what is the possible cause and the solution.

A The symptoms & effect described are typical of stall condition in a steam heated Heat Exchanger.

The "cool to touch" trap is a symptom of condensate not able to discharge through it and backing up into the heat exchanger. This reduces the effective heating surface area in the Heat Exchanger resulting in reduce heat transfer. The temperature of the outgoing heated water begins to fall and the control valve opens a little more. Soon the pressure in the heat exchanger becomes high enough to push the condensate through the steam trap.

This higher steam pressure with the increased effective heat exchange area raises the outgoing temperature of the heated water and

the steam valve closes and the pressure in the Heat Exchanger drops. The condensate cannot be pushed out through the trap and the cycle repeats.

This results in the control valve hunting & the outgoing heated water temperature fluctuating from 77 to 83°C. Solutions available, such as vacuum breaker + static head method and pump trap combination are available for existing heat exchange installations.

For more detailed explanation, please visit www.spiraxsarco.com/sg and click on the Steam Engineering Tutorial, Condensate Removal, Heat Exchangers & Stall or contact your local Spirax Office / Engineer.

If you would like to find out if flash steam recovery in your plant could be practical and economic, contact our Spirax Sarco engineer today! (Contacts on backpage).



In this column, we feature customers' questions and answers provided by our Technical and Training Manager, Mr Chng Poh Beng.

Simply send your questions marked "Dear TC" to Reyers.Wang@sg.spiraxsarco.com or to fax number 65-6459 6854. Kindly indicate if you do not wish to have your name and/or your company's name published. We reserve the right to edit the questions and not to publish them. If your question is published in Steam Express, you will receive a corporate gift.