Dewar Filling Solutions

from Thames Cryogenics Ltd

Total Cryogenic Solutions

Cryogenic Cluster Day 22/09/2010
Dewar vessel

- *noun.* A container with an evacuated space between two walls, capable of maintaining its contents at a near-constant temperature over relatively long periods of time.
Simple decant hose

Suitable for all manual filling applications

- Handle
- Rigid filling tube
- Sinter
- Sinter shroud
- Variable length and diameter.
Safety improvement for manual decanting

- Fail-safe
- Uncomplicated
- No services required.

Mechanical dead-man’s handle
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Improvements over mechanical DMH
- Easier to use
- Space
- Push button can be remote from decant point

But does require electrical supply and possibly pneumatics.
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For end of line decant points, combination with a gas vent system pre-cools line and prevents large gas discharge

- Interface prevents operation until gas vent has operated.

Push-to-fill combined with gas vent
For sites with a high pressure tank

- Deals with inlet pressures up-to 20 bar
- Provides free-venting liquid for open dewar filling
- Variant available with level sensor for auto filling.
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Features
- Manual valve
- Filter
- Pressure reducing valve
- Phase separator
- Vacuum insulated exhaust
- Manual decant flexible
- Wall or floor mounted on frame.

Pressure-reducing open dewar filling station
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For the filling of pressurised dewars (liquid cylinders) from a bulk tank:

- Automated fill
- Deals with any size dewar
- Can be sited inside buildings if required
- Reduces pressure from source if required

Pressurised dewar filling station
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- Temperature controlled
- Optional proximity sensors
- Relief valves combined for ease of piping away
- Wall or floor mounted on frame
- Optional swipe card system for access and logging.

Pressurised dewar filling station
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Where multiple dewar fill stations are required

- Combined control panel
- Combined feed and vent streams.

Multi-pressurised dewar filling station
Current ways of getting LN$_2$ to areas that are remote from the supply point

- Manual handling of dewars from delivery point to use point
- Vacuum jacketed pipework from bulk tank to use point.
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Drawbacks with manual handling of dewars

- Physical weight of a full dewar (up to 1/3 tonne) means any risk assessment will advise against moving them
- Weight of liquid is supported on thin neck tube in dewar which is prone to damage if dewar is not moved carefully, particularly across uneven ground
- Use point may be on a different level meaning that the dewar needs to be placed within a lift!!!
Drawbacks with piping systems

- Systems which are run ‘dry’ can have long waiting times to get liquid at use points. Multiple decants of small volumes during a day result in the pipe being cooled frequently and high losses.

- Systems which are run ‘wet’ have static losses which can be quite high. Keeping a pipeline full of liquid means throwing away liquid.
Thames Cryogenics have developed the ISIS system to overcome these problems.

Essentially we have created a hybrid system that gives all the convenience of liquid on demand without the penalty of high liquid consumption and importantly ticks all the boxes with respect to safety.

In a nutshell the dewar remains in the room or location where liquid is required and is filled once a day, automatically via a vacuum superinsulated pipeline.
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Components of an ISIS

- Pressurised dewar – Can be existing, user owned or leased or supplied as part of a new package
- QPL3K control panel – A highly sophisticated, programmable control panel that controls filling, decanting and venting and can be wired to depletion systems to shut-down in an emergency. Can be configured to fill on a timed basis or when the dewar has reached a preset level. Can also be used with key card access to prevent unauthorised use
Components of an ISIS (contd)

- Valve arrangement mounted on a frame for ease of installation, utilising high reliability valves and designed to allow all safety valves and vent valves to be piped away to a safe area.

- Vacuum superinsulated pipework to convey liquid to the ISIS from a bulk tank with a minimum of boil off.
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Result

- Liquid on demand for either manual decanting or for automatic feed into other equipment
- Minimal losses in pipework system
- Removal of hazardous handling of pressurised dewars
- Enclosed system of flow and return so gas generated during filling is piped safely away
- Links to detection systems and BMS to ensure full monitoring and safety.

ISIS – Internally Sited Intermediate Storage