BREWERS ASSOCIATION OF AUSTRALIA & NEW ZEALAND Inc.

Draught Beer Dispense Systems Installation Guidelines

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These Draught Beer Dispense Systems Installation Guidelines (the "Guidelines") are recommendations only and are provided subject to the following disclaimer.

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- recommends that you obtain your own independent specialist advice regarding the installation of your dispense system as these Guidelines may not be appropriate for your particular needs, objectives or circumstances.

These Guidelines should be used as a guide only and you should not rely on the Guidelines as a mechanism for ensuring compliance with your legal obligations. Should you have any questions or suggestions relating to these Guidelines, please contact the Brewers Association.

Contents

1.0 Introduction

These Guidelines have been developed by the Brewers Association of Australia and New Zealand Inc. for the following purposes:

- To increase the safety of beer outlets, their staff and their consumers through the implementation of improved draught beer dispense systems.
- To provide guidance on how to achieve a beer dispense system that will present tap beer to the **highest standard and quality** at the most reasonable cost to the customer and consumer.
- To provide a guide that can be issued to prospective contractors for the preparation of comparable quotations for the installation of a draught beer dispense system.
- To minimize beer wastage and its associated cost in beer outlets.

These Guidelines refer to relevant Australian Standards. There is a legal obligation to comply with the requirements of these Standards.

2.0 Dispense Performance Criteria

It is recommended that beer dispense system equipment should be able to dispense beer at the tap to the following:

- The temperature of the beer coming from the tap can range from -0.5 to 2 °C to suit regional climatic conditions and consumer expectations. It is acknowledged that to appreciate the true flavour of a typical Australian lager that it be consumed at a temperature of around 2 – 3 °C.
- All beers dispensed from a refrigerated cellar system are recommended to use one of the following, carbon dioxide (CO_2), mixed CO_2/Nitrogen (N_2), or beer pumps, the choice being determined by the design of the system and the normal trading conditions.
- Beer Pumps may be driven by CO_2 or compressed oil free air. The industry recommendation is air compressors to minimise cost to venue and to reduce the carbon footprint.
- No loss of CO_2 or breakout of CO_2 should occur from the keg to the dispense point.
- Only CO_2 for non-refrigerated systems or a mixture of CO_2 and N_2 for refrigerated systems should be used for dispensing. Where a mixture is used, the gas mixture should be as advised by the appropriate brewing company.
- There should be no discernible flavour difference between the beer in the keg and the beer dispensed in the glass. All beers should taste true to type and have no off-flavour or aroma.
- No material or lubricant in contact with the beer should affect the foam formation or retention.
- All lubricants, gases or materials that come into contact with the beer should meet any the requirements of any relevant authorities, such as Food Standards Australia New Zealand, State and local Health Departments, etc
- The system should be capable of delivering beer at the flow rates recommended by the relevant brewing company. In most cases for typical Australian beers the following apply
    - Deliver beer during all trading periods at the specified flow rate of 70- 80 mL sec
    - Maintain the specified dispense temperature range which is typically between 0.5 – 3 °C during all trading periods

3.0 Beer System Layout

To encourage proper use of dispense equipment, the beer system layout should be user-friendly, tidy and easy to service, maintain and keep clean.

Access to the keg area should be clear and be suitable for use with trolleys. Kegs should be positioned to minimise the amount of lifting and manoeuvring by staff when setting up and tapping.

Adequate ventilation is required around refrigerator/chiller units and areas where dispense gas is being used. Ventilation and environment need to comply with Australian Standard AS 5034.

The complete layout should meet all Local, State and Federal government regulations and any other applicable laws or standards.

All electrical requirements should be installed by a qualified/authorised person (see section 4 below).

It is recommended that beer lines and all associated fittings be cleaned at least weekly or as advised by the relevant Brewery.

It is recommended that clear signage should be displayed at the tap point and in the Cold/Cool room whilst beer lines are being cleaned. Beer line detergent material safety data sheets should be displayed, including safety information on detergents being used.

4.0 Technician Qualification and Competency

Beer dispense systems should only be installed by competent people. Particular attention should be paid to those tasks where formal or informal qualifications are required by relevant Federal, Local and/or State regulatory authorities.

5.0 Coldrooms / Coolrooms

5.1 General

The location should be situated to minimize length of pythons and provide ease of access for kegs and ease of exit in emergency.Cool/Cold rooms are frequently used to store keg beer. The main purposes of using such rooms are to ensure that the beer is stored at a constant temperature, to maximize the shelf-life of the product and to minimise the heat load on the dispense refrigeration system. The cool/coldroom should be for beverage storage only.

5.2 Safety

When constructing cold/cool rooms, consideration should be given to the following:

- Safe entry/exit
- Minimal manual handling for kegs
- Exits with emergency opening devices on the inside
- Adequate artificial lighting
- Effective drainage, in the event of spillages
- A means of dispersing, venting or detecting CO_2 (in the event of a gas leak) which complies with applicable legal requirements, in particular with Australian Standard AS5034
- Sizing the room to minimise the need for stacking of full kegs
- Insulation thickness based on operating and ambient temperatures

6.0 Coolrooms / Coldrooms

6.1 Tapping Boards

It is recommended that beer dispensing equipment should not be directly affixed to cool room walls. Any installation should have beer lines, manifolds and washout systems fixed to a tapping board of hygienic construction, which is easily cleaned.

Preferred materials for tapping boards include plastic or stainless steel. When stainless steel tapping boards are used, tubing is to be fixed with clips or saddles rather then cable ties or similar types of fixing.

All fixing bolts and screws in the cellar should be of stainless steel.

Tapping boards should be silicon sealed onto the coldroom panel wall.

6.2 Line Runs

Beer, water and gas lines should be run in ducts or clipped to a running board, for their entire length. They should not be taped or draped loose over pipes, beams, rafters, etc. or run loose in ceiling spaces or under the floor.

Running boards should be of similar material, thickness and finish to the tapping boards. All lines should be clipped flat to the running board.

6.3 Ducts

Beer, water and gas lines may be run in ducts as an alternative to running boards to increase protection of the lines and to avoid light strike. There are a number of requirements to allow the lines to be installed in, or run through, ducts.

- Ducts should be sized and constructed to accommodate easy installation of the python.
- Ducts should have as few bends as possible.
- Changes of direction should be kept to a minimum and should be as sweeping as possible.
- Sharp bends should be avoided.
- Ducts should be positioned above the tapping board equipment.

6.4 Cable Trays

Where pythons are routed through a ceiling space, the python should be adequately supported by a suspended duct, cable tray or python rack.

The cable tray/python rack should be of sufficient size to allow an air gap between pythons to eliminate condensation. Stacking of pythons on top of each other is not recommended, as this can also lead to condensation within the python. It is important not to “over tighten” the cable ties as this will damage the insulation and may cause condensation problems.

6.5 Wall Penetrations

All penetrations should be sleeved with PVC pipe and the gap between the sleeve and wall sealed with an appropriate sealant.

Where a penetration is made through a coolroom wall, any remaining gap inside the sleeve, after the lines have been run, should be sealed appropriately with a clean airtight finish.

All penetrations for gas tubing need to comply with Australian Standard AS5034.

6.6 Cold Water Supply for the Washout System

A cold water supply, in close proximity to the tapping area, is required. The minimum required cold water supply is a 12 mm ID line.

The cold water supply should be pressure regulated and fitted with a stop tap. The location of the stop tap should be readily accessible to allow the water washout system to be isolated when not in use, and should be located outside the cold /cool room.

Advice should be sought from the local water authority for backflow prevention requirements as this is typically a requirement of local regulatory authorities and should be installed by a licensed plumber.

7.0 Gas Systems

7.1 Safety

Gas reticulation systems for keg beer dispensing need to comply with Australian Standard AS5034.

Consideration needs to be given to minimizing the effects of inadvertent gas leaks by:

- Ensuring adequate ventilation
- Installing electronic monitoring where appropriate
- Regularly testing for gas leaks, particularly at joiners, fittings and coupler connections.
- Following the maintenance recommendations of AS5034

Safety pressure relief valves must be fitted to protect kegs in case of acute regulator failure.
Different gases are used to dispense keg beers depending on storage temperatures and pressures. The correct settings and gas type are available from the relevant brewing company.

Where gas driven beer pumps are installed and driven with a gas containing CO_2, the pump exhausts need to be vented in accordance with Australian Standard AS5034. While the preference is compressed air, standby systems can often be CO_2 based. In such cases all beer pumps must be vented to atmosphere,

7.2 Gas Cylinders

Gas cylinders need to be stored in accordance with relevant Australian Standards and in particular AS5034.

Where possible, gas cylinders should be stored above ground and in a well ventilated area.

All gas cylinders, both full and empty, should be stored cool and away from direct sunlight. They should be stored upright and restrained to prevent from falling over, and never be stored in cold /cool rooms.

7.3 Regulators

Regulators and distribution/supply systems need to comply with Australian Standards AS4267 and AS5034

It is very important that the correct regulator (high pressure or low pressure) is used in the correct place in the system. High pressure regulators should be used when the in-feed pressure is above 2400 kPa, and low pressure regulators below 2400 kPa. Refer AS5034.

A bottle contents gauge should be fitted.

Supply and distribution systems should be sized to ensure adequate gas flow at peak user rates, with an adequate number of regulators.

7.4 Gas Lines

Gas lines need to be installed in accordance with Australian Standard AS5034.

Only gas lines rated for their usage pressures should be used.

Tubing should be continuous and free of joins.

Where exposed to UV light, the tubing should be UV resistant and protected.

Where tubing is cleaned as part of the weekly beer-line cleaning circuit, the tubing should be resistant to the cleaning solution chemicals.

7.5 Instructions

Clear operating instructions need to be provided to staff on applicable aspects of the system. These are spelled out in AS 5034.

8.0 Beer System - General

8.1 Routing of the Beer Lines

The route selected for the beer line, from the keg to the tap, is critical to success of the beer system.

To minimise the quantity of beer in the system, at any given time, the beer lines should travel via the most direct practical route.

Where practicable, beer lines should not be installed in areas subject to heat, e.g. ceiling or roof spaces, plant rooms and kitchens or in the vicinity of glass washers, compressors, etc. Heat causes the gas in the beer to come out of solution, producing gas breaks in the line. Gas breaks in the system inevitably result in excessive wastage through heady beer at the tap. A considerable quantity of beer can be wasted in clearing the gas break from the line.

Heat will also accelerate spoilage and flavour changes, resulting in an undesirable lowering of the quality of the dispensed product.

Wherever possible, beer lines should be routed through a duct run under the floor or cast into the slab. Unnecessary vertical rises should also be avoided.

8.2 Materials

All tubing and fittings that come in contact with the beer should have no effect on the quality of the product.

Recommended materials for tubing and fittings are stainless steel and certain inert food grade, such as certain plastics/nylon (see below). Brass or chrome plated brass should not be used in contact with beer.

8.2.1 ***Stainless Steel:*** Stainless steel beer lines are virtually permanent, and being totally impervious, protect the beer from external influences such as odours.

8.2.2 ***Multi Layer Barrier Tubing:*** Multi-layer, **nylon inner**, barrier tubing is highly recommended as an economical substitute for stainless steel. It is virtually impervious, has a glassy smooth inner bore and an expected life of 12 – 15 years, if properly maintained. Its flexibility is an obvious advantage over stainless steel.

8.3 Clipping of Beer Lines

Beer, water and gas lines should be clipped flat to a running board, or other suitable material, for their entire length or via a ducting system located above tapping board.

Lines should be run along plumb vertical and horizontal lines, and secured with clips at intervals that ensure the lines are straight and true.

Clips should be appropriately sized so that the secured lines are not deformed or restricted.

Where possible, all bends should have a minimum radius of 100 mm and a neat, uniform appearance. Bends made in stainless steel tubing should be made in such a way that the tubing is not flattened or deformed.

8.4 Protection of Beer, Gas and Water Lines

All lines should be protected from damage by abrasion, Ultraviolet (UV) radiation or sunlight.

Care should be taken to ensure that, at any point where lines could rub and wear, a protective sheath or other precaution is employed to protect the tubing.

Plastic lines should never be installed in a position, which is exposed to UV radiation or sunlight, without a protective covering, as it can become brittle and rupture. Beer flavour is also affected by UV radiation and sunlight.

8.5 Fittings

There are a number of fittings that may be used on lines. These vary in style and materials. Fittings for use in beer systems should be food grade stainless steel or food grade plastic (see Appendix 1).

Where used, internal olives or barbs should be correctly sized for the tubing to ensure there are no gaps between the fitting and the tube. This avoids restriction of the line.

Fittings should be machined to a smooth finish internally and externally.

All edges and surfaces should be free from:

- metal burrs,
- intrusions into the beer stream, and
- crevices that would be difficult to sanitise.

Stainless steel tubing, which has been cut, should be filed to remove burrs and to open the tubing to its full diameter.

Where push-in style fitting are used, care should be taken to ensure that the external diameter of the tubing is within the limits of the fitting. The fitting should be compatible with the tubing material to be used. Further, in order to ensure a secure join, the tubing should be cut perfectly square and a collet tool used.

8.6 Balancing the Beer System

A primary consideration must be to establish the correct top pressure for whichever gas is used so that the correct CO_2 content of the beer is maintained with no loss or gain. A beer temperature and pressure relationship exists and a chart is located in Appendix 2. This provides the necessary data. This determines the system pressure and all balancing is then completed using the 4mm or 5mm OD riser line at the bar

The dispensing philosophy is based on balancing the restriction through the beer line, from the keg to tap, against the pressure applied to the keg to achieve the desired flow rate at the tap.

The bore of the tubing and fittings, between the keg and beer cooler, should be uniform or progressively reducing with no sudden opening up of the bore. The majority of the restriction, or

pressure drop, in the beer reticulation system occurs between the inlet of the beer cooler/heat exchanger and the tap. The mechanism used to achieve this restriction is a 4 mm or 5mm inside diameter (ID) lead from the beer cooler outlet to the tap.

The length of tap lead required to achieve the recommended flow-rate at the tap as recommended by the brewery (70 - 80 mL/sec) is dependent on a number factors and can be calculated. (See Appendix 2.)

It is desirable to avoid using larger diameter tube to balance the system, as this requires longer lengths to achieve the same balance. Subsequently greater volumes of beer are allowed to warm in the tap lead during non-trading periods, resulting in temperature fluctuations and potential wastage.

The final operating pressure applied to the keg in a fully refrigerated beer pump system should take into account any vertical lift between the keg and beer pump. Only 10 kPa is added for each metre of lift.

9.0 Beer System – Beer Line Configurations

There are a number of beer line systems that can be used to deliver beer from a keg, or bank of kegs, to the tap. These include:

- Individual Lines provide beer to a single tap.
- Python Systems that maintain the temperature of the beer from the tapping area to the tap.

9.1 Individual Lines

9.1.1 Individual lines allow the flexibility to dispense from only as many taps as are needed. Additionally, taps can be closed down individually during slow trading periods, minimising the quantity of beer sitting in the lines unnecessarily.

Individual lines also provide brand flexibility, by making it relatively simple to change the brand dispensed through a tap, without affecting other taps. A big advantage of this system is that it allows users to completely run out a keg or bank of kegs with minimal disruption to trading, as fresh beer can be tapped up on another line ready to dispense.

By combining individual lines with manifolds, the number of kegs required to be tapped is also minimised.

9.1.2 Recommended tubing is available in a range of internal and external diameters. The most suitable tubing, for an individual beer line, will be dependent on the length of the run. Whilst it is desirable to minimise the amount of beer in the system by using smaller tubing, care should be taken to ensure that the pressure drop, over the length of the beer line, does not reduce the pressure on the beer below the minimum required to prevent gas breaks.

The majority of the pressure drop or restriction, in a non-refrigerated beer line, should be between the beer cooler inlet and the tap.

9.1.3 Manifolds allow up to four taps to be served by a single keg or bank of kegs. To ensure adequate beer flow to all taps, the distribution manifold should be fed via a drop line that has a minimum internal diameter of 12 mm.

Where beer lines are connected to a manifold, they should be of sufficient length to allow individual lines to be disconnected from the manifold and attached directly to a keg sitting at floor level.

9.2 Trunk Systems

9.2.1 Trunk line systems may be suitable for installation where a small number of brands are to be dispensed from a number of taps, in the same bar, and the tapping area is some distance from the dispense point.

The amount of beer in a single trunk line is less than the total in four smaller individual lines.

The major drawback of the trunk system is its lack of flexibility and, in many cases, the inability to run out a keg or bank of kegs without disrupting trading. All the taps fed from the trunk line will be lost for a time unless an automatic keg change system is installed to automatically supply beer from a fresh keg or bank of kegs.

9.2.2 Ideally, trunk systems should be run in 9.5mm ID stainless steel as the tubing of preference. However 9.5mm ID multi layer barrier tubing may be used in some situations.

9.2.3*:* To maintain sufficient flow to all points off the trunk system, the recommended minimum pressure to be applied to the keg is 280 kPa and the minimum length of 4 mm tap lead is 1800 mm.

9.2.4 Trunk systems should be fitted with a recommended crosshead fitting at each take-off point. The flexible lead from the crosshead to the cooler should be terminated with a beer line check valve.

9.3 Python Systems

A beer python consists of an insulated trunk containing both beer lines and lines for recirculating Food Grade Propylene Glycol/chilled water. They are designed to maintain the cool storage or dispense temperature of the beer, from the tapping area to the bar.
Insulation must be closed cell 0.034w m/k thermal rating – this is a measure of the thermal capacity of the insulating material and is an internationally accepted standard.

9.3.1 Python systems deliver a number of advantages over conventional systems. They can maintain beer quality in slow moving or intermittently operating beer systems, where the beer can be in the lines for long periods. By keeping the beer cool in the line, lower pressures are required to prevent gas breaks in the line.

9.3.2 Pythons should be designed by the manufacturer for each application. The design should ensure that:

- The number and positioning of Food Grade Propylene Glycol/water lines is sufficient to maintain the beer temperature within the required range.
- The design itself, and the construction and installation, should eliminate the risk of cross contamination between coolant and product
- The insulation thickness is adequate to achieve the desired beer temperature and to prevent condensation on the external surface of the python. It should suit peak climatic conditions and conserve energy.
- The construction of the python is appropriate with adequate internal and external wraps.
- The tubing used for the beer lines within the python is a recommended beer line material and should incorporate multi layer barrier tube.
- Adequate flow and return lines as per manufacturer's recommendation to each heat exchanger should be allowed for.

9.3.4. All python installations should ensure that the system is totally insulated to a standard that prevents the formation of condensate, both internally and externally. This includes all joins and connections, particularly those in the bar area. The effectiveness of the python may be compromised, if the quality of the insulation at joins and connections is not maintained. No exposed beer lines should exist outside the coolroom.

10.0 Beer System - Beer Cooling

Beer cooling is an essential element of any draught beer installation. Cooling has two major functions, its primary purpose being to cool the beer to the desired temperature in the glass, and as much as possible, to maintain beer at the most desirable temperature during keg storage.

10.1 Beer Coolers

The beer cooler or cooling system chosen for any installation should be capable of delivering beer in the glass within the temperature range required by the Brewery (generally -0.5 - +3 ^{o}C), at a flow rate required. It should also have the capacity to sustain this performance throughout the entire trading period, including the peak demand periods.

A prime consideration when assessing beer cooling options is the maintenance of product quality in periods of slow, intermittent, or during non-trading periods.

If there are any doubts, advice should be sought from the relevant brewing company.

10.2 Keg Storage

It is recommended that draught beer be stored in a cold / cool room facility at a constant temperature of between 0 -10 °C in order to provide the best quality beer, consistent presentation and a reduction in the refrigeration load on beer coolers.

10.3 Flooded Fonts

Flooded or chilled fonts have chilled water or glycol circulating through the font to maintain the temperature of the beer all the way to the tap.

Flooded fonts are commonly used to enhance the cold look of the beer font or to complete a chilled python system. Chilled fonts also have some application in non-python installations, particularly where trading patterns are slow and wastage occurs as the beer between the cooler and the tap warms.

Care should be taken with water or glycol chilled fonts to ensure that:

- All flooded fonts are mounted in a stainless steel recessed drip tray or a raised plinth drip tray with an inbuilt drain for either.
- If timber or particle board comes in contact with moisture or condensation, it should be rated for use under these conditions or water damage may occur.
- All tap leads in flooded fonts should be of nylon barrier type tubing.

10.4 Refrigeration Capacity

The required (beer system) refrigeration plant capacity should be specified in any quote and be only that required to run the Beer System unless specifically requested by ordering party to cover “other” refrigeration., i.e. the appropriate refrigeration capacity is determined by a heat load calculation. Additionally all assumptions and calculations on heat loads performed to arrive at the total maximum lead and the required plant size should be included with the quote.

10.5 Glycol Tank (under no circumstances is ethylene glycol to be used)

The system should include a refrigeration liquid line isolation valve at the tank
The remote tank should be located in the keg coolroom where possible and should be mounted on a robust non-corrosive stand. The tank should be of a size adequate to deliver the performance specified and should incorporate a removable sealed lid to minimise moisture ingress. Self contained glycol units should not be located in coolroom.

NB: The Propylene Glycol used must conform to the requirements of the Food Standards Code Standard 1.3.4 Identity and Purity. It may need added food grade inhibitors if it comes into contact with aluminium. The Propylene Glycol should be used at the concentration recommended by the refrigeration equipment supplier.

10.6 Glycol Pumps

Ideally pumps should be mounted vertically and be of a suitable size and type to provide adequate flow to achieve specified performance. Where chiller plates or other in-line beer cooling heat exchangers are used, the minimum flow rate required to each heat exchanger is 6 litres per minute

or per the manufacturer's recommendation. Much higher flow rates will be required for beer line runs with high heat ingress or heavy cooling demands.

10.7 Glycol Manifolds

Glycol installations should include a suitable glycol flow manifold and return manifold which incorporate flow regulation valves on the return lines and isolation valves on the flow lines. Manifolds should be constructed in stainless steel or brass and insulated externally to prevent ice or condensation forming. A flow meter should be provided on each glycol line. Each flow and return line should be labelled to identify destination.

10.8 Coolroom mounted or Under-bar Heat Exchange Unit (chiller plate)

Design and operation of under bar glycol heat exchange unit should be adequate to deliver performance specified under all trading conditions. The unit should be mounted securely and provide access for inspection and service. Heat exchangers can be installed in the coolroom when allowance has been made in the python construction for adequate glycol flow and return lines and for appropriate insulation.

10.9 Drip Trays

For new installations it should be confirmed with the project manager that a suitable recessed stainless steel drip tray has been detailed in bar joinery drawings. Where necessary, allowance should be made for supply and installation of a recessed or plinth drip tray to an existing bar counter as required. Hard plumbed fixed drip tray drains to nearest available tundish or waste with a minimum 19mm OD drain sizing should also be included.

11.0 Washout / Cleaning System

Every installation should incorporate a washout/cleaning system to facilitate cleaning/ water flushing of the beer lines. The cleaning system is fitted from the stop tap and should incorporate the features detailed in this section.

11.1 Pressure Reducing Valve

A pressure reducing valve should be installed in-line immediately after the stop tap to reduce the water pressure to match the beer dispense gas operating pressure. The pressure reducing valve should be deleted if the town water pressure is equal to, or less than, the required gas operating pressure.

NB: Special precautions should be taken to prevent pressurised backflow into the town water supply. The local regulatory authority or applicable plumbing code should be consulted for backflow prevention requirements.

11.2 Physical Break

In accordance with local statutory requirements, a connection with a check valve is required to enable the washout system to be physically isolated from the town water supply. The physical break should be arranged so that, when it is disconnected from the water supply, the check valve can be plugged into a detergent supply to enable detergent to be introduced via the washout system.

11.3 Washout Crossheads

From the physical break a washout line should be run onto the tapping board and crosshead fitting should be provided in the washout line. This enables the keg couplers/beer lines to be plugged into the washout line to flush the beer lines with water or detergent.

The number of crosshead fittings should allow for each keg coupler/beer line to be simultaneously connected to the washout line, either via a manifold or individually, with an additional crosshead to allow gas to be introduced if required.

11.4 Size of Washout Line

The diameter of the washout line should be sized to provide adequate flow to allow all lines to be flushed simultaneously after cleaning.

11.5 Materials

The preferred materials for the washout line are stainless steel, nylon, multi-layer barrier tubing or medium density polyethylene (MDP). All fittings should be stainless steel or food grade plastic (see Appendix 1).

11.6 Bypass Cups

The washout system should also provide sufficient keg coupler bypass cups to enable all keg couplers and transfer leads to be hooked up in series and flushed, or detergent cleaned in place with the rest of the system.

11.7 Beer Recovery

Beer recovery systems, such as blowback, are detrimental to the quality of the product and therefore not recommended.

11.8 Beer Line Cleaning/Detergents

Beer is biologically unstable and therefore must be treated as any other food. It demands a clean dispense system at all times. Line cleaning should be carried out according to the manufacturer's instructions or brewing company advice. Common beerline cleaning chemicals are Detergents which are strongly alkaline (caustic) or combined Detergent/Sanitisers that can be either strongly alkaline or less so in the case of the lower pH products. The choice of cleaning products should be based on ***safety***, effectiveness and system design, and can be discussed with brewing company representatives.

Handling of beerline cleaning products should follow the relevant Material Safety Data Sheet.

Detergent pumps should be compatible for use with the beer line cleaner per the manufacturer's recommendation and should be rated to the dispense pressure and be capable of providing an adequate flow to service four taps simultaneously.

12.0 Miscellaneous Equipment

There are a number of items of equipment that can be included in any draught beer system installation to provide specific benefits or advantages.

12.1 Fob Detectors

Fob Detectors are used to ensure that, when a keg or bank of kegs empties, the beer flow is stopped. Construction should be of stainless steel end plates with perspex barrel with a spring loaded bleed valve. This ensures that the beer lines are not emptied or gas allowed to break up the beer in the line between the fob detector and the tap. A new keg or bank of kegs can be tapped and bled through to the fob detector and trading recommenced with minimal disruption to trading.

Fob detectors should be provided for all glycol installations for each drop lead, either individually or manifolded.

A suitable drain should be provided for each fob monitor and run to waste. Drain lines should not plumbed into permanent drains since good hygiene is more difficult and any beer flow is not visible should the bleed valve fail. If the fob detectors' drain lines are connected to a common line, it should be inclined to avoid any build up of microbial residue.

12.2 Beer Taps

These should be food grade stainless steel or plastic construction

12.3 Keg Couplers & Transfer Leads

An adequate number of keg couplers (complete) and transfer leads should be ensured where these are required or where existing equipment does not comply with section 8.5.

12.4 Labelling

All components should be appropriately labelled in the cellar, at bar, on gas system and wash out boards etc in accordance with the applicable Australian Standard.

12.4 Other Equipment

Any equipment not included in these guidelines should comply with the regulatory requirements of all relevant authorities.

Appendix 1 – Appropriate Fittings with Recommended Parameters.

EQUIPMENT TYPE	ITEM/PURPOSE	RECOMMENDED GRADES/PRODUCTS/TYPES
General.	In contact with beer	Food Grade Stainless steel
		Plastic /Rubber, inert food grade suitable for potable liquids
Beer line fittings	Cellar termination for connection to keg coupler.	Food Grade Stainless steel check valve
	Other connections.	Food Grade Stainless steel compression fittings. Plastic push-in type fittings
Tapping Equipment	Keg couplers	Food Grade Stainless steel with adaptors
	Transfer leads	0.5" ID beer tube with Food Grade stainless steel type fittings, or similar with check valve (spring loaded type) on both ends.
Gas Line Fittings	Gas line for connection to keg coupler	Stainless or chrome plated steel, with check valve and non-return valve.
	Other connections	Brass or stainless steel compression fittings. Plastic push-in type fittings. NB: Brass should not be used if it is to come into contact with caustic cleaning detergents
Gas Regulators	For use with CO_2	AS4267 - 1995 or later /AS5034
	For use with mixed gas	AS4267 - 1995 or later/ AS5034
	For use bulk gas	AS4267 - 1995 or later/ AS5034
Beer Lines	For reticulation of beer.	Food Grade Stainless steel Multi-layer nylon inner barrier tubing. The internal diameter of the line should be sized to meet the functional requirements of the job 4 or 5 mm ID for tap leads.
	Pythons	Generally custom designed for each job and machine made to specification using recommended multi layer nylon inner beer line tubing and medium density polyethylene (MDP) water lines.
Gas Reticulation	Gas lines	Nylon. The internal diameter of the line should be sized to meet the functional requirements of the job
Washout System	Lines	Stainless Steel /Nylon/MDP. The internal diameter of the line should be sized to meet the functional requirements of the job

Appendix 2 – Calculating the length of tap lead required to achieve the recommended flow-rate

The length of tap lead required to achieve the recommended flow-rate at the tap can be calculated following the establishment of:
The minimum gas pressure to be applied to the keg. This can be determined by establishing:
The maximum temperature the beer is likely to reach, at the warmest point in the beer line, and determining the equilibrium pressure.
The restriction in the beer line from the keg to the cooler, plus the restriction in the cooler itself (Table 1).
The restriction required through the tap lead is then equal to (i) minus (ii). The length of 4 mm ID tap lead, required to balance the system, is calculated on the basis of 100 mm for every 15 kPa of restriction.

Tap lead length can be calculated with the following formula:

$$\text{Tap Lead Length} = \frac{\text{Keg pressure - (Restriction in cooler + Restriction in line + Vertical Lift)}}{\text{Restriction per cm in Tap Lead}}$$

Note: Pressure in kPa, length in cm.

Table 1. Pressure Drop Through Lines and Coolers

Tubing Type	Nominal Size	Pressure Drop kPa/Metre
Beer Tube	4mm	135
	5mm	45
	6mm	15
	8mm	4.5
	10mm	1.9
	12.5mm	0.5
Stainless Steel	1/2”	1.3
Multi Layer Barrier	12.5mm	1.3
Nylon	12.5mm	1.3
Beer Coolers	Pressure Drop kPa	
Instantaneous	20	
Icebank	30	
Chiller Plate	112	