Cooling Specifications Document

January 2017

The following specification has been created following examination of the cooling and refrigeration requirements for the draught beverage industry and through consultation with the draught product suppliers, the manufacturers of the cooling equipment, and the installers of cooling equipment.

The joint specification has been agreed in order to set minimum standards for the required cooling equipment and the installation of that equipment.

It is essential that the electrical energy consumption of the draught beer cooling system is minimised wherever possible. Therefore each installation must be carefully designed to ensure any potential energy reduction opportunity is calculated and outlined in the planning stages with the customer / outlet owner.

All companies installing beer cooling systems must provide the customer / outlet owner with energy reduction options in the quotation with details of any additional costs and the benefits of choosing the more energy efficient options.

The installation contractor must hold F Gas Company Certification, in accordance with Commission Regulation (EC) No. 303/2008.

When designing and installing refrigeration systems consideration must be given to future changes in relation to regulation of refrigerant gases to ensure new systems are compliant into the future and not just at commissioning stage. When designing the system preference must always be given to refrigerants with lower Global Warming Potential (GWP).

This specification will be regularly reviewed to ensure that the necessary standards are being applied to both cooling system design and quality of installation.

The latest version of this specification is available on the Beer section of the Drinks Ireland website.

Please contact the Technical Committee of the Drinks Ireland | Beer for further information.

NOTE:

All installations must be planned in advance through consultation with the local technical services / quality representative of each draught product supplier.

Any deviation from the specification must be authorised by the technical services / quality department of each draught product supplier before installation commences.

Drinks Ireland | Beer Cooling Specifications (June 2016) incorporating;

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B. Equipment and Installation Standards Specification

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(A) Preface

This specification concerns systems that are used for the storage and cooling of draught beer.
Three distinct systems, which have common components, are described:

- Conventional System
- Full Glycol System
- Hybrid Glycol System

VAPOUR COMPRESSION CYCLE REFRIGERATION

Beer cooling in an outlet is achieved using a mechanical vapour compression system. Several cooling systems may be in place in a single outlet, e.g. cold-room, ice-bank, bottle-coolers. A mechanical vapour compression system operates using a closed thermodynamic cycle, and can be represented theoretically by the Carnot cycle. The objective is to absorb heat from a low temperate sink and dissipate heat to a high temperature source, using work input. The four processes that constitute the thermodynamic cycle are as follows:

1	Compression (compressor, providing work input)	a - b
2	Heat rejection at a high temperature (condenser)	b - c
3	Expansion (expansion valve / capillary tube)	c - d
4	Heat absorption at a low temperature (evaporator)	d - a

The working fluid in a vapour compression cycle is called a refrigerant (e.g. R404a).

Figure 1 illustrates a schematic diagram of a vapour compressions system and a pressure-enthalpy[1] chart of the cycle.

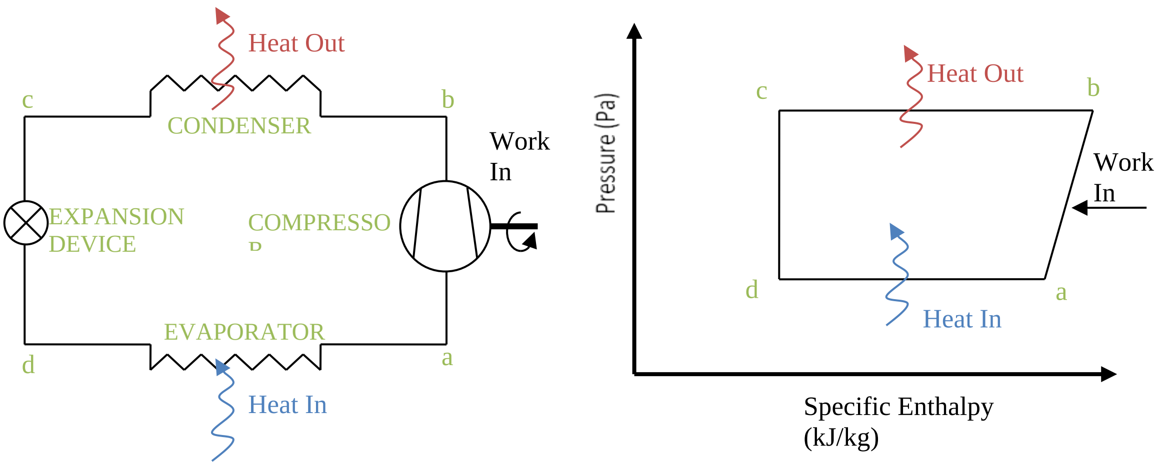


Figure 1 *Schematic Diagram and P-h plot of a Vapour Compression System.*

The refrigerant exits the evaporator (point a) as a cold gas and enters the compressor, where it is compressed to a higher pressure and temperature (point b). The high temperature gas is condensed in the condenser, typically using ambient air, blown over the condenser heat exchanger. High-temperature, liquid refrigerant is expanded, partially vapourised and cooled as it passes through the expansion device, from point c to point d. This low-temperature liquid is vapourised at a low temperature in the evaporator, thus absorbing heat from the fluid that passes through the other side of the heat exchanger (e.g. air, water, glycol solution). This fluid that passes over the other side of the heat exchanger is therefore cooled by the vapourising refrigerant. Cold, gaseous refrigerant is available for compression at point (a) again, thus completing the cycle.

[1] Enthalpy is the measure of the total energy of a system

The efficiency, or COP (coefficient of performance) of the Carnot cycle is calculated using the following formula:

$$\mathrm{COP} = \frac{\mathrm{T_c}}{\mathrm{T_h} - \mathrm{T_c}}$$

T_h = Refrigerant temperature in the condenser (K)
T_c = Refrigerant temperature in the evaporator (K)

The COP is a measure of the quantity of cooling that is delivered divided by the work (or electricity) input to the system. The COP is maximised by minimising the difference in temperature between the condenser and the evaporator. This may be achieved by maximising the temperature at which cooling is carried out, and minimising the temperature at which heat is rejected.

1. CONVENTIONAL SYSTEM

Figure A.01 illustrates a schematic diagram of a conventional draught beer cooling system.

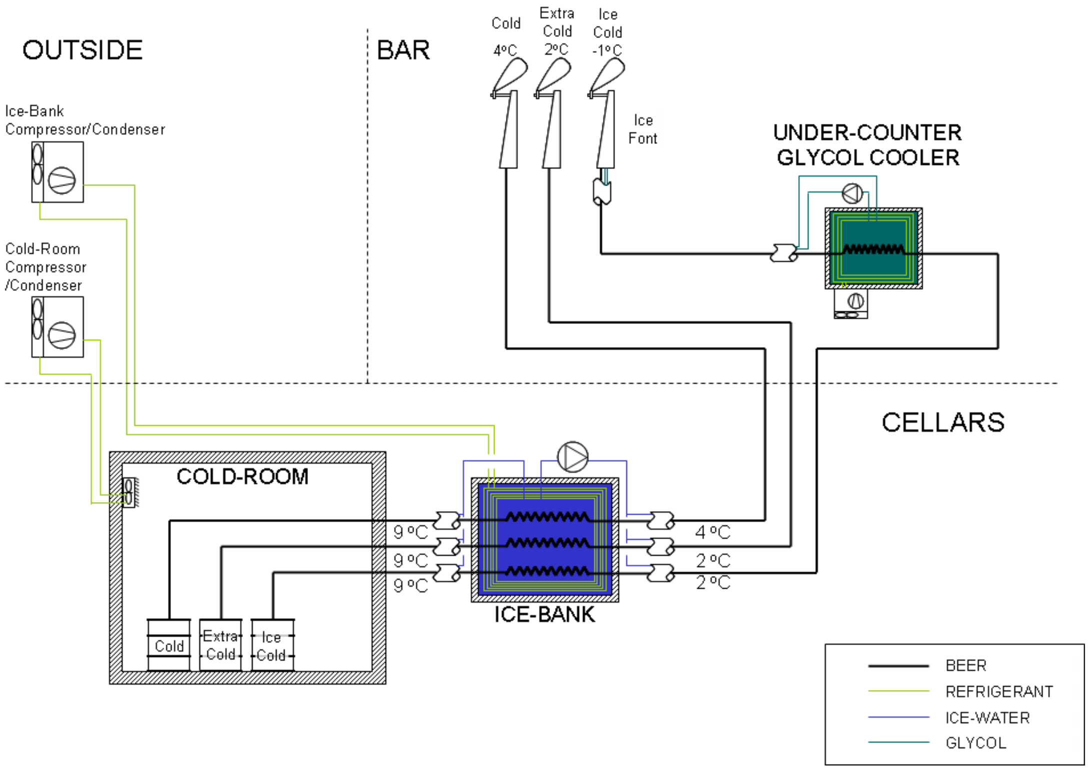


Figure A.01 *Conventional System.*

The kegs are stored in a coldroom at 8°C +/- 1°C. The Cold (4°C) and Extra Cold (2°C) dispense temperatures are achieved by passing the 9°C beer through stainless steel beer-coils that are immersed in the ice-bath (0 °C). The length of each coil determines the outlet beer temperature. The insulated ice-bath and associated refrigeration unit is situated remotely from the bar area. Beer in the supply line is maintained at the desired temperature by passing 0°C water through pipes within the python. This 0°C water is continuously pumped in a closed loop from the ice-bath through the pythons.

The Ice Cold beer is chilled to 2°C using the ice-bath system. The 0°C dispense temperature is then achieved by passing the beer through a stainless steel beer-coil, which is immersed in a sub zero glycol-bath (- 3°C). This glycol cooler is located at the point of dispense in the bar area. The glycol coolers also provide a means of cooling the "iced fonts", to achieve the frosted effect. The glycol mix in the glycol-bath (circa -3°C) is pumped to the "iced font" via pipes in the mini python from the glycol cooler.

The coldroom, ice-bath and glycol cooler each have separate refrigeration systems.

2. FULL GLYCOL SYSTEM

Figure A.02 illustrates a schematic diagram of the Full Glycol draught beer cooling system.

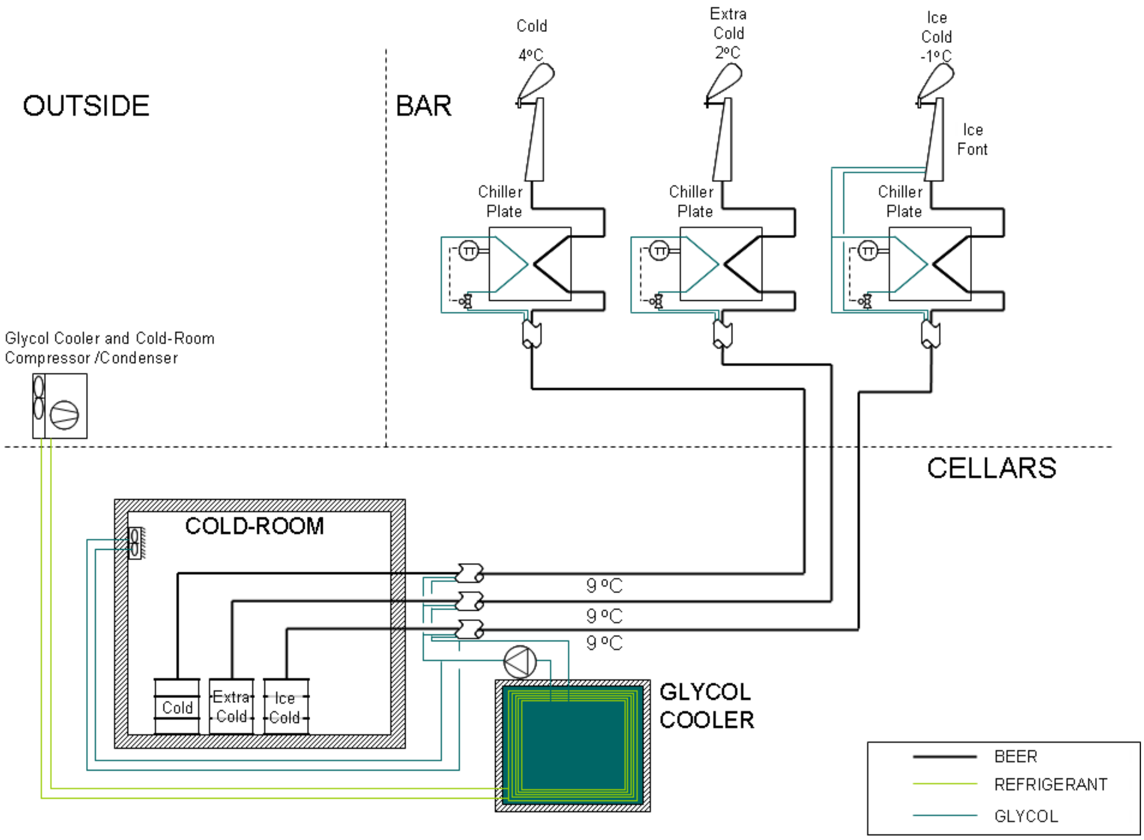


***Figure A.02** Full Glycol System.*

The kegs are stored in a coldroom at 8ºC +/- 1ºC. The beer is supplied from kegs in the cold-room via a python, and is cooled to the set point temperature using aluminium block heat exchangers (chiller plates) that are located at the point of dispense. The cooling duty is performed using sub-zero glycol, which is supplied to the heat exchangers and to the “iced fonts” via pipes within the pythons. The continuous flow of glycol through the pythons maintains the beer in the supply lines at the desired temperature. The beer dispense temperature is achieved by controlling the temperature of the aluminium block and the proportion of time that glycol is supplied to the relevant heat exchanger. A solenoid valve delivers glycol to the heat exchanger when cooling is required, as dictated by the temperature transmitter within the body of the heat exchanger. Therefore, the proportion of time that glycol is supplied is dictated by the temperature of the aluminium block.

- The glycol cooler is located remote from the bar area.
- The cold-room cooling duty is met using sub-zero glycol from the glycol cooler.
- There is one refrigeration system (compressor/condenser).
- Alternatively, if there is an existing cold-room installation (with associated refrigeration system) then a dedicated compressor / condenser unit can be used for the cold-room.

3. HYBRID SYSTEM

Figure A.03 illustrates a schematic diagram of the hybrid draught beer cooling system.

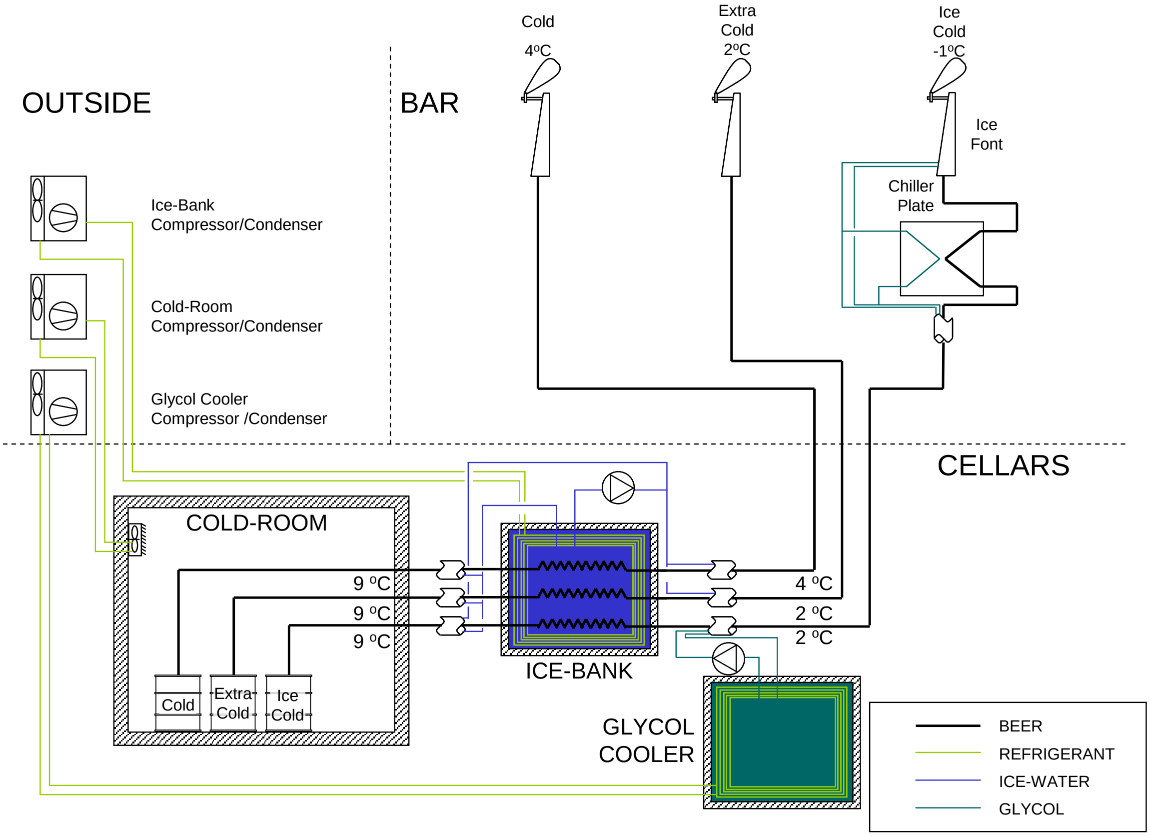


Figure A.03 *Hybrid Glycol System.*

The kegs are stored in a coldroom at 8°C +/- 1°C. The ice-bank and stand-alone cold-room system are retained from the conventional system, and the under-counter coolers are replaced with a remote glycol cooler. Trim cooling of the ice-cold products takes place using heat exchangers (chiller plates) located in the bar area to achieve the Ice Cold dispense temperature. The heat exchangers are supplied with sub zero glycol from the glycol cooler. The "ice font" is also supplied with sub-zero glycol from the glycol cooler via the pythons. The continuous flow of ice water (Cold and Extra Cold products) and glycol (Ice Cold products) through the pythons maintains the beer in the supply lines at the desired temperature.

The cold room, ice-bath and glycol cooler each have separate refrigeration systems.

Alternatively the cold-room cooling duty is met using sub-zero glycol from the glycol cooler.

(B) - Equipment and Installation Standards Specification

1) SPECIFICATION: COLD ROOMS FOR STORAGE OF DRAUGHT PRODUCT

1.1 Cold Room Construction and Assembly

1) All equipment must be CE marked.

2) It is recommended that draught product kegs be stored in cold rooms where the temperature is maintained 8°C (+/- 1°C).

3) The insulated panels will be manufactured using a minimum of 100mm of high density polyurethane* foam insulation, sealed within a skin of hot dipped galvanised steel sheet of not less than 0.6mm, finished in a white food safe PVC as standard.
    - Density not less than 42 kg/m3
    - Thermal conductivity not more than 0.022W/mK
    - Minimum burn extent of 125 mm, in accordance with BS EN 4735
    - Free of CFCs and HCFCs
    - Surface spread of flame: plastic laminate BS476 part 7 class1
    - Surface spread of flame: galvanised BS476 part 7 class O

*NB: In certain circumstances polyurethane foam may not be acceptable. Installing contractor must always check with customer that higher spec alternative material is not required. (eg PIR foam)

4) The doors will be hinged (preferably opening out) / or sliding with insulation and finish as cold room. Door hardware is aluminium grey enamelled or stainless steel and includes hinges, handles, fasteners and internal safety release. An air-tight seal between the cold-room door and door-frame must prevent the ingress of air and moisture. An alarm system should be considered to indicate if the coldroom door is not shut correctly.

5) The prefabricated rigid polyurethane foam panels are moulded to fit snugly into the insulated ceiling sections and each other. The panels must be sealed with a general purpose mastic and pulled together by special power-locks (fitted at manufacture) so that they form an airtight, vapour proof and vermin proof construction.

6) The internal height of the cold room must not be less than 2 metres.

7) After erection of the wall panels, the internal vertical joints must be sealed with a silicone sealant that contains a fungicidal additive.

8) Where cold rooms are located upstairs they must require an insulated floor to prevent condensation underneath and sealed to prevent leakage to lower floors.

9) Two non-corroding protection rails must be fixed horizontally to protect the cold room walls from damage by kegs, one rail at a height of 450mm and the second rail at a height of 750mm above the floor.

10) A wallboard, for the purpose of mounting FOBs etc., must be fixed horizontally with the lower edge at a minimum height of 1200mm from the ground, to extend along all cold room walls. The wallboard must be 20mm thick timber pre-treated before installation to prevent mould (the timber <u>must not</u> be medite, chipboard or sterling board).

11) Within the cold room all beer lines must be enclosed within plastic trunking mounted above the wallboard on the wall or ceiling. The trunking, which will be sized to carry all beer lines, must be terminated neatly at the point of exit through the cold room wall/ceiling.

12) All holes made in the cold room for the purpose of tube/cable access must be sealed with silicone sealant, as used for panel joints.

13) The cold room must be illuminated by one or more vapour proof and corrosion resistant enclosures to IP54 or better. The lux level must comply with EN 12464 and all relevant health and safety legislation/guidelines. The lighting must be wired independently of the refrigeration system. PIR switching may be used to automatically turn off the lights when the cold-room is unoccupied. LED or high-efficiency T5 lamps are the preferred option.

14) It is recommended that the floor area of the cold room will accommodate (in one tier) the number of kegs for one week's usage, plus floor space to allow access by bar staff. The recommended minimum floor area = *(one week's keg usage) X (0.2)* M^2.

15) Kegs must not be stored more than 3 rows deep against the cold room wall and the outer most row must be only one keg high. Kegs must be stored and stacked in line with Health and Safety legislation/guidelines.

16) A 20mm hole must be made in a wall panel,1.2 metres from the ground level, to facilitate the fitting of FOB drains. If there are two doors then two drains must be fitted.

17) The cold room must be constructed, within outer building structure to ensure it is weatherproof, on a flat concrete floor. The concrete floor must be bonded to prevent it from crumbling under the impact of beer kegs. The floor must be sealed against the ingress of water.

18) The floor must be covered in a non-slip surface/coating, and must be suitable for hosing down.

19) All new coldroom locations in an outlet must have a floor drain to waste.

20) It is mandatory that the customer (publican) provide a mains water supply (tap) and 220V electrical socket at a location immediately outside the coldroom, for line cleaning purposes. The water supply must be fitted with a double non-return valve.

21) All coldrooms must comply with Health and Safety Confined Spaces Legislation & HSA Guidelines and therefore the customer (publican) must have a fixed CO_2 monitor installed and have it serviced annually.

22) When a coldroom is being refurbished in an outlet (existing coldroom panels being used with new refrigeration equipment and / or new chiller being fitted) it is important to ensure all surfaces are cleaned thoroughly before new fob boards are fitted. This will improve the overall cleanliness of the coldroom and improve the beerline hygiene and product quality.

1.2 Cold-Room Refrigeration Equipment (Direct Expansion Systems)

1) All equipment must be CE marked.

2) The contractor must hold FGas Company Certification, in accordance with Commission Regulation (EC) No. 303/2008. The installation must be completed by competent, suitably trained personnel. The contractor who signs off the installation must be trained and certified to Category I Commission Regulation (EC) No. 303/2008 (e.g. FETAC or City and Guilds). The contractor must have documentation available for inspection to demonstrate that these requirements are met. The contractor must sign a declaration that these requirements are met.

3) The cold room refrigeration system must be direct expansion utilising a refrigerant that conforms to Regulation (EC) No 842/2006 (commonly referred to as F-gas Regulation), EN 378-1:2000 and any other relevant national or EU legislation regarding the health and safety or environmental impact of refrigerants. Consideration must be given to future changes in relation to regulation of refrigerant gases to ensure new systems are compliant into the future and not just at commissioning stage.

4) The cold room refrigeration system must consist of an air cooled condensing unit connected to a matching forced air evaporator controlled by an electronic controller mounted in a control panel. In some circumstances a water cooled condensing unit may be the most energy efficient system and should be considered.

5) The fan assisted evaporators must be ceiling mounted 'box type' coolers and must be selected and installed to ensure that there is adequate air movement to maintain an even temperature throughout the room. The fin spacing must not be less than 4mm and must match the condensing unit with a temperature difference between the refrigerant saturated suction temperature and the evaporator entering air temperature of not greater than 7.5°K. Only high efficiency fans, which meet one (or more) of the following requirements must be used:

   – SFP1 (Specific Fan Power < 500 W/(m3/s)), according to EN 13799.
   – Meets the minimum energy efficiency requirements of Commission Regulation (EU) No 327/2011 (Ecodesign Fan Regulation), when tested according to ISO 5801 (fans greater than 125 W).
   – Forms part of a cold-room system, which meets the minimum requirements of the Ecodesign Regulation for Walk-In Cold Rooms.

6) Air cooled Condensing Units must consist of a hermetic compressor, finned condenser, condenser fan and receiver. Air cooled units must be mounted a minimum of 300mm above ground level and located outdoors to ensure an adequate flow of ambient air. The unit must never be located in direct sunlight – ideally the unit should be mounted on a north facing wall. **The unit must also be enclosed in a weatherproof louvered housing which doesn't restrict the flow of cool ambient air. The housing unit should ideally be factory made and designed specifically for the unit it is to protect.**

   The compressor sizing and the system cut-in and cut-out pressures must be carefully considered to ensure that compressor short-cycling does not occur, and that the frequency of cycling does not exceed the manufacturer's specification.

   The unit must have all necessary compressor starting kits and be fitted with safeties such as compressor overload and high/low pressure switch. Each unit must be fitted with local isolators where necessary and installed in an accessible location.

- ♦ The refrigeration system must be energy efficient. The refrigeration system compressor and condenser system should ideally be qualified for, and listed on, the SEAI Accelerated Capital Allowance Register for "Compressors and Condensing Units".

7) The control panel must be an IP65 rated enclosure and must contain an electronic controller incorporating thermostat, defrost timer, audible/visual alarm and on/off switch which must be mounted on the outside of the cold room adjacent to the door. The system for a beer coldroom will not require electrical defrost as the temperature required is not freezing or for food storage. The controller must have a digital display that shows temperature and operating status. The thermostat must be located in the air stream prior to passing across the evaporator coil to measure the air temperature accurately. The control panel will include all necessary contactors together with MCB protection for each individual electrical component and electrical control circuit in accordance with ETCI electrical standards (Electro Technical Council of Ireland).

8) The installing contractor must include for the supply and installation of refrigerant quality copper tubing between the evaporators and the matching condensing unit. Design, materials and installation of refrigerant piping systems must be to the Safety Code of Practice for Refrigerating Systems Utilising A1 Refrigerants and EN 378-1:2000.

9) Design must ensure correct refrigerant distribution to evaporators with no liquid refrigerant drainage into the compressor during shutdown, or liquid entry during operation, and must avoid lubricant accumulation and slugging in the suction line.

10) The system will comprise of suction and liquid lines and will be complete with all necessary brackets, fittings, class 'O' insulation and a complete charge of refrigerant and synthetic oil. The drier, sight glass and expansion valve must be of the sweat type installed in accordance with best industry standards. All refrigerant pipe work must be adequately supported along its full length (a maximum of 1.3m between brackets). The contractor must ensure that the quality of the insulation (materials of construction, thickness, U value, installation standard etc.) is such that no condensation forms on the refrigerant pipework, the insulation surface; at the interface between the refrigerant pipework and the evaporator or on associated fittings. The seams and joints must be completely sealed and air-tight, to prevent moisture ingress.

11) The refrigeration system must be capable of reducing the temperature of the number of kegs equalling the throughput of a busy week from 20°C to 8°C in a period not greater than 72 hours.

12) Where the coldroom refrigeration system is part of a larger centralised direct expansion type system consideration must be given to fitting a refrigerant leak detection system for health and safety reasons.

1.3 Cold-Room Refrigeration Equipment (Full Glycol Systems)

1) All equipment must be CE marked.

2) The contractor must hold F Gas Company Certification, in accordance with Commission Regulation (EC) No. 303/2008. The installation must be completed by competent, suitably trained personnel. The contractor who signs off the installation must be trained and certified to Category I Commission Regulation (EC) No. 303/2008 (e.g. FETAC or City & Guilds). The contractor must have documentation available for inspection to demonstrate that these requirements are met. The contractor must sign a declaration that these requirements are met.

3) An MSDS (materials safety data sheet) for the neat glycol solution must be available for inspection and a copy must be left at the glycol cooler location in the outlet. To avoid any health and safety issues, neat glycol solution must not be left on the premises following commissioning.

4) The fan assisted heat exchangers must be constructed of a material that is suitable for use with and resistant against corrosion of glycol solutions of up to 40% W/W, in the temperature range of -5^{o}C to 30^{o}C, and at the maximum rated pressure of the distribution pump. Ceiling mounted 'box type' coolers must be selected and installed to ensure that there is adequate air movement to maintain an even temperature throughout the room. The fin spacing must not be less than 4mm. Only high efficiency fans, which meet one (or more) of the following requirements must be used:
   - SFP1 (Specific Fan Power < 500 W/(m3/s)), according to EN 13799.
   - Meets the minimum energy efficiency requirements of Commission Regulation (EU) No 327/2011 (Ecodesign Fan Regulation), when tested according to ISO 5801 (fans greater than 125 W).

5) The refrigeration system must be capable of reducing the temperature of the number of kegs equalling the throughput of a busy week from 20°C to 8°C in a period not greater than 72 hours.

NB: Switching from an existing direct expansion evaporator to a glycol-cooled cold-room will result in the requirement for a new heat exchanger, new pipework, new temperature stat and new control valve in order to deliver the required cooling duty. It is possible to modify an existing evaporator to work with glycol however, if the evaporator is not changed to a specific glycol evaporator this will increase the "pull down" time for the kegs. The installer must always advise the customer on best options.

6) The control panel must be an IP65 rated enclosure and must contain an electronic controller incorporating thermostat, defrost timer, audible/visual alarm and on/off switch which must be mounted on the outside of the cold room adjacent to the door. The system for a beer coldroom will not require electrical defrost as the temperature required is not freezing or for food storage. The controller must have a digital display that shows temperature and operating status. The thermostat must be located in the air stream prior to passing across the evaporator coil to measure the air temperature accurately. The control panel will include all necessary contactors together with MCB protection for each individual electrical component and electrical control circuit in accordance with ETCI electrical standards (Electro Technical Council of Ireland).

7) Glycol pipework must be insulated with a minimum of 19mm Class O, BS 476 insulation, with a taped external finish. If the pipework is to be pulled through an underground conduit then a more robust "sleeve-type" insulation is required instead of a taped finish.

8) The pipework must be adequately supported along its full length using brackets, with a maximum distance between adjacent brackets of 1.3 m.

9) The contractor must ensure that the quality of the insulation (materials of construction, thickness, U value, installation standard etc.) is such that no condensation forms on the glycol pipework, the

insulation surface; at the interface between the glycol pipework and the cooler / bath or on associated fittings. The seams and joints must be completely sealed and air-tight, to prevent moisture ingress.

2) SPECIFICATION: COOLERS FOR DISPENSING OF DRAUGHT PRODUCT

2.1 Conventional (Ice Bank) Systems

1) All coolers approved for use in the dispensing of draught product operate on the following principles:
    - Each cooler is an insulated stainless steel tank containing an iced water bath.
    - Each draught product passes through a stainless steel coil immersed in the water bath.
    - The ice bank(s) must be maintained by the direct expansion refrigeration system(s).

2) All new installations must have a coldroom in addition to a remote cooler.

3) All equipment must be CE marked.

4) The contractor must hold F Gas Company Certification, in accordance with Commission Regulation (EC) No. 303/2008. The installation must be completed by competent, suitably trained personnel. The contractor who signs off the installation must be trained and certified to Category I Commission Regulation (EC) No. 303/2008 (e.g. FETAC or City and Guilds). The contractor must have documentation available for inspection to demonstrate that these requirements are met. The contractor must sign a declaration that these requirements are met.

5) The cooler contains an ice bank/refrigeration system with a maximum of 48 beer coils.

6) All coolers must be rated to perform their duty at an ambient temperature of 30°C and must be capable of accommodating a 15-metre product coil.

7) All product coils must be 316 stainless steel tubes with a diameter of 9.5mm and a minimum wall thickness of 0.6mm. All lines must be clean and free of contaminants. All coils, regardless of length, must be fabricated in one continuous piece and pressure tested to 6 Bar (welding of coils will not be permitted). Coil lengths must be as specified by the Draught Product Suppliers for different products (refer to the technical manual).

8) All coolers must have adequate agitation to ensure an even water temperature of less than 1°C in the iced water bath at all times. An evenly distributed ice-bank must be maintained on the evaporator at all times.

9) All coolers must have one or two (one run and one standby) circulating water pumps, complete with check valves. Where two pumps are used they must operate with a "flip-flop" module in the control panel, allowing each pump to alternate cooling duty. The duration between switching over pumps is determined by the pump manufacturer & chiller supplier to ensure optimum performance and ensure no detrimental impact on life of the pump.

    The pumps must be capable of generating sufficient pressure to achieve a flow rate of not less than 6 litres/minute in all pythons installed and not greater than a 1°C water temperature increase in any python during periods of non-trading. The coolers must have stainless steel discharge and return headers for the connection of the pythons. High efficiency pumps and motors (independent or coupled) should be installed. Installing contractor must include options for energy reduction in the quotation.

10) Two non-return valves and two manual isolation valves must be installed to facilitate break-ins to the ice-bank system without the risk of water flowing back into the tank from the distribution circuit. The valves must be located between the outlet of the pumps and the supply manifold and between the return manifold and the tank. The supply and return manifolds must be insulated.

11) The cooler refrigeration system must be direct expansion utilising a refrigerant that conforms to Regulation (EC) No 842/2006 (commonly referred to as F-gas Regulation), EN 378-1:2000 and any other relevant national or EU legislation regarding the health and safety or environmental impact of refrigerants. Consideration must be given to future changes in relation to regulation of refrigerant gases to ensure new systems are compliant into the future and not just at commissioning stage.

♦ The refrigeration system must be energy efficient. The refrigeration system compressor and condenser system should ideally be qualified for, and listed on, the SEAI Accelerated Capital Allowance Register for “Compressors and Condensing Units”.

12) The evaporator must be refrigeration quality, seamless and solid drawn bare pipe (minimum 1/2” OD) wound in coil around the inside of the tank (Technical Specification: BS EN 1057:1996, ASTM B280-8, DIN EN 12735-1, DIN EN 12449). An evenly distributed ice-bank must be maintained on the evaporator at all times.

13) The tank sides and base must be double skinned with high-density polyurethane* foam insulation, sealed within the two skins of stainless steel, to reduce heat absorption and prevent condensation on the outside. The polyurethane foam must be:
- Density not less than 42 kg/m3.
- Thermal conductivity not more than 0.022W/mK.
- Minimum burn extent of 125 mm, in accordance with BS EN ISO 4735.
- Free of CFCs and HCFCs.

*NB: In certain circumstances polyurethane foam may not be acceptable. Installing contractor must always check with customer that higher spec alternative material is not required. (eg. PIR foam)

14) Each cooler must have an easily accessible water bath inspection hatch.

15) Each cooler must have a water bath overflow and a safe, controllable means of draining the waterbath (drain cock).

16) The refrigeration capacity of the coolers’ refrigeration system must be sufficient to fully cool the full throughput of product during the peak day and fully restore the cooler’s ice bank(s) before the start of dispensing on the next day. The combination of the refrigeration system must be such that the cooling demand during the peak periods can be met.

17) Air cooled Condensing Units must consist of a hermetic compressor, finned condenser, condenser fan and receiver. Air cooled units must be mounted a minimum of 300mm above ground level and located outdoors to ensure an adequate flow of ambient air. The unit must never be located in direct sunlight – ideally the unit should be mounted on a north facing wall. **The unit must also be enclosed in a weatherproof louvered housing which doesn’t restrict the flow of cool ambient air. The housing unit should ideally be factory made and specifically designed for the unit it is to protect.**

The compressor sizing, tank sizing and the system cut-in and cut-out pressures must be carefully considered to ensure that compressor short-cycling does not occur, and that the frequency of cycling does not exceed the manufacturer’s specification. The unit must have all necessary compressor starting kits and be fitted with safeties such as compressor overload and high/low pressure switch. Each unit must be fitted with local isolators where necessary and installed in an accessible location.

18) The installing contractor must include for the supply and installation of refrigerant quality copper tubing between the cooler and the matching condensing unit(s). Design, materials and installation of refrigerant piping systems must be to Safety Code of Practice for Refrigerating Systems Utilising A1 Refrigerants and EN 378-1:2000. The contractor must ensure that the quality of the insulation (materials of construction, U value, thickness, installation standard etc.) is such that no condensation

forms on the refrigerant pipework, the insulation surface; at the interface between the refrigerant pipework and the cooler or on associated fittings. The seams and joints must be completely sealed and air-tight, to prevent moisture ingress.

19) Design must ensure correct refrigerant distribution to evaporators with no liquid refrigerant drainage into the compressor during shutdown, or liquid entry during operation, and must avoid lubricant accumulation and slugging in the suction line.

The system will comprise of suction and liquid lines and will be complete with all necessary brackets to, fittings, class 'O' insulation and a complete charge of refrigerant and synthetic oil. The drier, sight glass and expansion valve must be of the sweat type installed in accordance with best industry standards. All refrigerant pipe work must be adequately supported along its full length.(Maximum of 1.3m between brackets)

20) Remote coolers should be installed as close to the outside of the cold room as possible, sited between the cold room and the bar areas. To minimise the python distance between line cooler and taps the coolers may be located closer to the bar area. Water from cooler must be circulated back to the cold room where the returns exceed 5 metres. Return water from supply pythons to be used.

21) Remote coolers should not be installed in areas with high ambient temperatures. Ideally the ambient temperature at the location will not exceed 15*C.

22) Remote coolers can be installed inside cold rooms but must not compromise the keg storage capacity.

23) The cooler must be adequately protected to prevent damage (e.g. keg barrier, installed on a plinth).

24) Remote coolers to be located in the ‘bar area’ or ‘under counter’ only as an exception with the express consent and agreement of the Draught Product Suppliers (since this will require special consideration for beer coil lengths).

25) Each cooler must be equipped with the following controls and switches:
- An on/off switch for each refrigeration system.
- An on/off switch for the agitator motor (where fitted).
- A four way 1/2/off/auto selector switch for the water pumps, including a flip/flop module.
- An oil filled pressure gauge indicating the water discharge pressure (optional).
- A digital controller (incorporating high temperature pump cut-out) indicating the actual water bath temperature.

26) The control panel must be an IP65 rated enclosure and must contain ice thickness electronic controller(s). The control panel will include all necessary contactors together with an RCD, and an MCB protection for each individual electrical component and electrical control circuit in accordance with ETCI electrical standards. The control panel must include a temperature display for the water bath temperature.

27) An independent panel IP65 rated enclosure must contain a digital thermometer incorporating high temperature audible/visual alarm must be supplied with each cooler. This panel must monitor the actual recirculation water temperature in the pythons and it must be mounted in the bar area. The purpose of this alarm is to confirm that the selected pump is actually recirculating the chilled water in the python(s).

28) The remote cooler(s) installed must have an independent clean electrical supply and the installation must conform to ETCI electrical standards.

29) The manufacturer must supply all coolers with the beer coil lengths clearly identified.

30) The manufacturer must supply all coolers with a chart to be used by installer to clearly identify what product and tap is connected to each coil.

31) Each cooler must have spare coils following completion of installation to cater for future requirements of the outlet. The number of spare coils must be equal to 15% of the total number of coils contained within the cooler. The maximum number of coils allowed is 48.

32) All coils must be fitted so that they can be replaced post installation without disconnecting the full python or the full cooler cover.

2.2 Full Glycol Systems

1) All remote glycol coolers approved for use in the dispensing of draught product operate on the following principles:
   - Each glycol cooler comprises of an insulated stainless steel or rotomoulded polyethylene tank. Only polyethylene or stainless steel outer surfaces are acceptable. The minimum allowable wall thickness of a polyethylene tank is 3.5 mm.
   - It contains a glycol/water solution of pre-determined strength to act as a secondary refrigerant.
   - Chilled glycol/water solution is pumped from the bath to one or more heat exchangers (chiller plates), which are used to cool beer prior to dispense.
   - The glycol bath(s) must be maintained at the desired temperature by direct expansion refrigeration system(s).
   - Glycol must also be used for python cooling, ice-font cooling and trace cooling.

2) All equipment must be CE marked.

3) The contractor must hold FGas Company Certification, in accordance with Commission Regulation (EC) No. 303/2008. The installation must be completed by competent, suitably trained personnel. The contractor who signs off the installation must be trained and certified to Category I Commission Regulation (EC) No. 303/2008 (e.g. FETAC or City and Guilds). The contractor must have documentation available for inspection to demonstrate that these requirements are met. The contractor must sign a declaration that these requirements are met.

4) An MSDS (materials safety data sheet) for the neat glycol solution must be available for inspection and a copy must be left at the glycol cooler location in the outlet. To avoid health & safety issues, neat glycol must not be left on the premises following commissioning.

5) Only food-grade propylene glycol, containing a food-grade corrosion and mould inhibitor must be used in the glycol bath. Glycol should only be handled and used for topping up the bath by <u>trained</u> personnel. The glycol solution must be made-up to a strength that is suitable for the full range of temperatures under which the system may operate. If in doubt always refer to the equipment manufacturer and glycol supplier guidance.

6) All glycol coolers must be rated to perform their duty at an ambient temperature of 30°C. Condensation must not form on the exterior surfaces of the glycol storage tank.

7) An even temperature must be maintained in all areas of the glycol bath at all times. There must be no "hot spots" or "cold spots".

8) All glycol coolers <u>must</u> have two circulating glycol pumps, one run and one standby, complete with check valves. These pumps must operate with a "flip-flop" module in the control panel allowing each pump to alternate cooling duty. The duration between switching over pumps is determined by the pump manufacturer & equipment supplier to ensure optimum performance and ensure no detrimental impact on life of the pump. The pumps must be enclosed by insulated soft-foam casing.

NB: For energy efficiency, Variable Speed Drives (VSDs) should be considered for the glycol pumps and controlled to ensure that the speed of the pumps should reduce in proportion to the cooling demand and are at maximum speed when demand is at its highest.

9) Two non-return valves and two manual isolation valves must be installed to facilitate break-ins to the glycol system without the risk of glycol flowing back into the tank from the distribution circuit. The valves must be located between the outlet of the pumps and the supply manifold and between the return manifold and the tank. The supply and return manifolds must be insulated with a minimum of 19 mm soft or hard foam insulation.

   Each supply pipe from the manifold must include a balancing valve that can be adjusted during commissioning and then locked in place. A specialist tool must be required to adjust the valve, thus preventing untrained personnel from making adjustments.

10) The pumps must be capable of generating sufficient pressure to achieve the minimum flow rate that is adequate to maintain a constant beer temperature in the pythons and to deliver the required cooling duty to all heat exchangers. The materials of construction of the pumps must be suitable for glycol at the required strength. The coolers must have stainless steel discharge and return headers for the connection of the pythons and/or glycol circuit lines. Energy efficient pumps and motors (coupled or as independent components) should be installed. The installing company must include energy reduction options in the quotation.

11) The glycol cooler refrigeration system must be direct expansion utilising a refrigerant that conforms to Regulation (EC) No 842/2006 (commonly referred to as F-gas Regulation), EN 378-1:2000 and any other relevant national or EU legislation regarding the health and safety or environmental impact of refrigerants. Consideration must be given to future changes in relation to regulation of refrigerant gases to ensure new systems are compliant into the future and not just at commissioning stage.

12) The refrigeration system compressor and condenser system should ideally be qualified for, and listed on, the SEAI Accelerated Capital Allowance Register for "Compressors and Condensing Units".

13) Two types of evaporators may be used, namely coils or heat exchangers.
   (A) Coils must be refrigeration quality, seamless and solid drawn bare pipe wound in a coil around the inside of the tank (Technical Specification: BS EN 1057:1996, ASTM B280-8, DIN EN 12735-1, DIN EN 12449). The coils must be constructed of a material that is suitable for use with and resistant against corrosion of glycol solutions of up to 40% W/W, in the temperature range of -5oC to 30oC, and at the maximum rated pressure of the distribution pump.
   (B) Heat exchangers must be stainless steel, brazed plate, refrigerant quality. The materials of construction must be fit-for-purpose and compatible with glycol solutions and the appropriate refrigerant. The heat exchanger must be constructed of a material that is suitable for use with and resistant against corrosion of glycol solutions of up to 40% W/W, in the temperature range of -5^{o}C to 30^{o}C, and at the maximum rated pressure of the distribution pump.

14) The tank sides, base, lid and inspection hatch must be double skinned with high-density polyurethane* foam insulation, sealed within the two skins of stainless steel (or polyethylene), to reduce heat absorption and prevent condensation on the outside. The polyurethane foam must be:
   - Density not less than 42 kg/m3.
   - Thermal conductivity not more than 0.022W/mK.
   - Minimum burn extent of 125 mm, in accordance with BS EN ISO 4735.
   - Free of CFCs and HCFCs.

*NB: In certain circumstances polyurethane foam may not be acceptable. Installing contractor must always check with customer that higher spec alternative material is not required (eg PIR foam).

In cases where a polyethylene tank is used it is acceptable to install a solid polyethylene lid in place of a double skinned stainless steel lid. The solid polyethylene must provide sufficient insulation to prevent condensation on the exterior of the lid. The minimum allowable thickness of the lid is 30 mm.

15) The glycol cooler must be a sealed unit, though it should not be hermetically sealed. It must be installed with an inspection hatch to facilitate glycol top-up and regular testing of glycol strength. It must only be possible to open the inspection hatch using a specialist tool, thus discouraging glycol top-up by untrained personnel.

16) The glycol bath should have a level indicator to signify changes in the glycol volume. The level must be clearly visible from outside the tank. High and low level indicators must also be included.

17) The tank must be adequately protected to prevent damage (e.g. keg barrier erected, installed on a plinth).

18) Each tank must have a safe, controllable means of drain down (e.g. drain cock).

19) Each glycol cooler must have an overflow piped to collection container. The internal diameter of the overflow should be minimised to prevent evaporation from the glycol bath. A liquid trap must be used to prevent the ingress of moist air.

20) The refrigeration capacity of the system must be sufficient to fully cool the full throughput of product during the peak day. The combination of the refrigeration system must be such that the cooling demand from the cold-room, chiller plates, pythons, trace cooling between chiller plates and taps and any additional cooling loads (e.g. iced fonts, bottle coolers, food stores) are met during the peak periods at all times of the year. Care to be given in the sizing of the glycol tank to ensure that at minimum load, the tank gives enough buffer capacity to prevent high frequency cycling of the compressor(s).

21) The contractor is responsible for producing a calculation of the peak cooling demand. This calculation must form part of any quote issued by the contractor.

22) The system must be capable of cooling draught beer at the maximum design throughput to the following temperatures:

Product	**Dispense Temperature**	**In Glass Temperature**
Cold Beer	$4^{o}C$ +/- $1^{o}C$	$5^{o}C$ +/- $1^{o}C$
Extra-Cold Beer	$2^{o}C$ +/- $1^{o}C$	$3^{o}C$ +/- $1^{o}C$
Ice-Cold Beer	$-1^{o}C$ +/- $1^{o}C$	$0^{o}C$ +/- $1^{o}C$

It is the responsibility of the contractor to adequately size all aspects of the system to ensure that this dispense temperature specification is met at all times.

23) Air cooled Condensing Units must consist of a hermetic compressor, finned condenser, condenser fan and receiver. Air cooled units must be mounted a minimum of 300mm above ground level and located outdoors to ensure an adequate flow of ambient air. The unit must never be located in direct sunlight – ideally the unit should be mounted on a north facing wall. **The unit must also be enclosed in a weatherproof louvered housing which doesn't restrict the flow of cool ambient air. The housing unit should ideally be factory made and designed specifically for the unit it is to protect.** In some circumstances a water cooled condensing unit may be the most energy efficient system and should be considered.

NB: The compressor sizing, tank sizing and the system cut-in and cut-out pressures must be carefully considered to ensure that compressor short-cycling does not occur, and that the frequency of cycling does not exceed the manufacturer's specification.

The unit must have all necessary compressor starting kits and be fitted with safeties such as compressor overload and high/low pressure switch. Each unit must be fitted with local isolators where necessary and installed in an accessible location.

24) The installing contractor must include for the supply and installation of refrigerant quality copper tubing between the cooler and the matching condensing unit(s). Design, materials and installation of refrigerant piping systems must be to Safety Code of Practice for Refrigerating Systems Utilising A1 Refrigerants and EN 378-1:2000. The contractor must ensure that the quality of the insulation (materials of construction, U value, thickness, installation standard etc.) is such that no condensation forms on the refrigerant pipework, the insulation surface; at the interface between the refrigerant pipework and the cooler or on associated fittings. The seams and joints must be completely sealed and air-tight.

25) Design must ensure correct refrigerant distribution to evaporators with no liquid refrigerant drainage into the compressor during shutdown, or liquid entry during operation, and must avoid lubricant accumulation and slugging in the suction line.

26) The system will comprise of suction and liquid lines and will be complete with all necessary brackets to, fittings, class 'O' insulation and a complete charge of refrigerant and synthetic oil. The drier, sight glass and expansion valve must be of the sweat type installed in accordance with best industry standards. All refrigerant pipe work must be adequately supported along its full length (Maximum of 1.3m between brackets).

27) Each glycol cooler must be equipped with the following controls and switches:
- An on/off switch.
- An on/off switch for the agitator motor (where fitted).
- A four way 1/2/off/auto selector switch for the glycol pumps using a flip/flop module.
- An oil filled pressure gauge indicating the glycol discharge pressure (optional).
- A digital controller (incorporating high temperature pump cut-out) indicating the <u>actual</u> glycol bath temperature.
- An "ultimate low" or "low low" thermostat that will cut out the compressor in the event that the glycol temperature in the bath reduces below -5^{o}C.

28) The control panel must be in an IP65 rated enclosure. The control panel will include all necessary contactors together with an RCD, and an MCB protection for each individual electrical component and electrical control circuit in accordance with ETCI electrical standards. The control panel must include a temperature display for the glycol temperature in the tank.

29) An independent panel IP65 rated enclosure with a digital thermometer incorporating high temperature audible/visual alarm must be supplied with each cooler. This panel must monitor the <u>actual</u> recirculation water temperature in the pythons and it must be mounted in the bar area. The purpose of this alarm is to confirm that the selected pump is actually recirculating the glycol solution in the python(s).

30) The glycol cooler(s) must have an independent clean electrical supply and the installation must conform to ETCI electrical standards.

31) The in-bar heat exchangers (chiller-plates) must comprise the following:
   a. Stainless steel glycol pipe and 316 stainless steel beer pipe, enclosed by a cast-aluminium block.

b. All product coils must be 316 stainless steel tubes with a diameter of 9.5mm and a minimum wall thickness of 0.6mm. All lines must be clean and free of contaminants. All coils, regardless of length, must be fabricated in one continuous piece and pressure tested to 6 Bar (welding of coils will not be permitted).
c. Where product coils have been subjected to high temperature in the chiller-plate manufacturing process the coils must be passivated.
d. The glycol section must be pressure tested to 250 psig and rated to -12^{o}C.
e. High-density polyurethane* foam insulation, sealed between the aluminium block and the cladding:
    - Minimum thickness of 35 mm.
    - Density not less than 42 kg/m3.
    - Thermal conductivity not more than 0.022W/mK.
    - Minimum burn extent of 125 mm, in accordance with BS EN ISO 3582:2001.
    - Free of CFCs and HCFCs.
    - Vapour barrier.
    - Prevent condensation forming on the outside of the cladding.
    - Prevent the ingress of moisture / moist air.
f. Food-grade PVC or stainless steel cladding.
g. Stainless steel glycol connections.
h. Control valve (e.g. solenoid valve) to control the temperature of the block, and hence the outlet beer temperature. The control valve must be constructed of materials that are compatible with the glycol solution at the required strength.
i. Temperature transmitter embedded in the aluminium block, which supplies an analogue signal that is used to control the control valve.

*NB: In certain circumstances polyurethane foam may not be acceptable. Installing contractor must always check with customer that higher spec alternative material is not required (eg. PIR foam).

32) A single chiller-plate can supply a minimum of two taps and up to a maximum of 8 taps. All plates must be certified by manufacturer that performance will not be negatively impacted if all coils are used. Only beers that are dispensed at the same temperature must be cooled using the same chiller-plate.

33) The maximum allowable distance between a chiller plate and any tap that it is serving is 3 m. There may be some flexibility to extend this distance up to a maximum of 5 m, but only following written authorisation from the relevant draught product suppliers. Trace cooling must be provided to ensure heat pick up between chiller plate and tap is minimised.

34) There must be a minimum of one spare coil on each chiller plate.

35) The control valve must be rated IP65 or better.

36) All electrical components that are to be located in the bar area must be designed and installed to so that there is no risk of injury to bar staff. Electrical safety standards referenced in this specification must be adhered to.

37) The set-point temperature of the dispense beer on each chiller plate must be adjustable, using a digital controller located in the bar area. The controller must be password protected, to ensure that only trained personnel have access to change the set-points. The controller should also emit a visible (flashing light) and audible alarm if the temperature of the chiller plate exceeds a temperature that is 2^{o}C above or below the set-point. The controller should be IP65 rated.

38) The controller for each chiller plate must include a “line cleaning” switch, which isolates the supply of glycol, via a solenoid valve, to that chiller plate during beer line cleaning. There must be a clear visual indication that the controller is in “line cleaning mode”.

39) The system must be capable of providing coolant for condensing fonts as well as ice-fonts (e.g. by supplying a mixture of supply and return glycol to the font) and must be configurable to provide trace cooling between the chiller plates and the fonts & taps.

2.3 Hybrid Glycol Systems

1) The hybrid glycol system comprises the conventional ice-bank system described in ***Section 2.1*** of this specification and a dedicated remote glycol cooling system for dispensing ice-cold beer.

2) The specifications for the ice-bank and glycol coolers are the same as those outlined in ***Section 2.1*** and ***Section 2.2*** respectively of this document, with the following exceptions:

- The glycol tank does not require two pumps with a flip-flop module. A single distribution pump is adequate. Consider using a Variable Speed Drive (VSD) pump.
- Chiller plates are used to cool ice-cold products only (with fixed inlet and outlet temperatures). Control valves (eg solenoid valves) are not necessarily required to achieve the required outlet beer temperature. However, selection of the appropriate chiller plate (i.e. surface area, geometry, surface finish etc.) is critical to ensure that the correct cooling duty is supplied under all operating conditions, and that the temperature of the cooled beer meets the specification.
- The set-point temperature of ice-cold beer is not adjustable and therefore a digital controller is not required for each chiller plate.

The chiller-plates must comprise the following:

a. 316 stainless steel glycol pipe and 316 stainless steel beer pipe, enclosed by a cast-aluminium block.
b. All product coils must be 316 stainless steel tubes with a diameter of 9.5mm and a minimum wall thickness of 0.6mm. All lines must be clean and free of contaminants. All coils, regardless of length, must be fabricated in one continuous piece and pressure tested to 6 Bar (welding of coils will not be permitted).
c. Where product coils have been subjected to high temperature in the chiller-plate manufacturing process the coils must be passivated.
d. The glycol section must be pressure tested to 250 psig, and rated to -12^{o}C.
e. High-density polyurethane* foam insulation, sealed between the aluminium block and the cladding:
   - Minimum thickness of 35 mm.
   - Density not less than 42 kg/m3.
   - Thermal conductivity not more than 0.022W/mK.
   - Minimum burn extent of 125 mm, in accordance with BS EN 4735.
   - Free of CFCs and HCFCs.
   - Vapour barrier.
   - Prevent condensation forming on the outside of the cladding.
   - Prevent the ingress of moisture / moist air.
f. Food-grade PVC or stainless steel cladding.
g. Stainless steel glycol connections.

*NB: In certain circumstances polyurethane foam may not be acceptable. Installing contractor must always check with customer that higher spec alternative material is not required (eg PIR foam).

3) The controller for the glycol bath must have a "line cleaning" switch, which must temporarily raise the glycol temperature to 1°C during line cleaning. There must be a clear visual indication that the unit is in "line cleaning mode".

4) Both the glycol and ice-bath systems must be fitted with independent panels in IP65 rated enclosures. Each panel must contain a digital thermometer, incorporating a high temperature audible/visual alarm. An independent panel IP65 rated enclosure must contain a digital thermometer incorporating high temperature audible/visual alarm must be supplied with each cooler. This panel must monitor the actual recirculation water / glycol temperature in the pythons and it must be mounted in the bar area.

5) The system must be capable of cooling draught beer at the maximum design throughput to the following temperatures:

Product	**Dispense Temperature**	**In Glass Temperature**
Cold Beer	4°C +/- 1°C	5°C +/- 1°C
Extra-Cold Beer	2°C +/- 1°C	3°C +/- 1°C
Ice-Cold Beer	-1°C +/- 1°C	0°C +/- 1°C

6) A single chiller-plate can supply a minimum of two taps and maximum of 8 Taps. All plates must be certified by manufacturer that performance will not be negatively impacted if all coils are used. Only beers that are dispensed at the same temperature must be cooled using the same chiller-plate.

7) The maximum allowable distance between a chiller plate and any tap that it is serving is 3 m. There may be some flexibility to extend this distance up to a maximum of 5 m, but only following written authorisation from the relevant draught product suppliers. Trace cooling must be provided to ensure heat pick up between chiller plate and tap is minimised.

8) Ice Cold product must be initially cooled using a coil on the ice bank chiller before connecting to the chiller plate.

9) There must be a minimum of one spare coil on each chiller plate.

3) SPECIFICATION: PRODUCT LINE & PYTHON SYSTEMS

1) Pythons used in the Conventional System with water used as a cooling medium:
   - 5+2+2 Line Python.
   - 9+2+2 Line Python.
   - 13+2+2 Line Python.

2) Pythons used for the Full Glycol System with glycol used as a cooling medium:
   - 9+4 Line Python.
   - 13+4 Line Python.

3) The assembly of water-cooled pythons for Conventional System must comprise:
   - 2 no. MDPE water lines (2 X 9.5mm OD) – *never used for product.*
   - 2 no. MDPE cooling water lines (2 X 17.4mm OD).
   - Product lines (9 no. or 13 no.) surrounding the two 17.4mm OD water tubes.
   - A layer of polyethylene film surrounding the product lines.
   - A layer of minimum 19mm Class O, BS 476 insulation.
   - A taped or sleeved external finish.
   - Product information on the outside surface.

4) The assembly of glycol-cooled pythons for Full Glycol System must comprise:
   - 4 no. MDPE cooling glycol lines (4 X 15mm OD).
   - Product lines (9 no. or 13 no.) surrounding the glycol tubes.
   - A layer of polyethylene film surrounding the product lines.
   - A layer of minimum 25mm Class O, BS 476 insulation.
   - A <u>sleeved</u> external finish (taped finish is not acceptable).
   - Product information on the outside surface.

5) Product lines must:
   - Be taint free and have a smooth nylon 11 inner surface layer.
   - Have low gas permeation not exceeding 5cm³/meter/day/bar of CO².
   - Be manufactured from food grade 100% virgin raw materials.
   - Be approved by the German SK Zert Authority for dispensing beer, soft drinks and potable water.
   - Comply with all EU directives & regulations governing the use of plastics in contact with food and also be US FDA compliant.
   - Be printed with the date and time of manufacture, size & material specification.
   - Be identified by coloured stripes as per technical drawings.
   - Be manufactured in a facility approved to EN ISO 9001:2008 and EN ISO 14001:2004.

6) In the case of Python cooling using water, the cooling must be sufficient to ensure that no rise in beer temperature occurs between the coldroom and the inlet to the ice-bank, between the outlet of the ice-bank and the tap and (where relevant) between the chiller-plate and the tap.

7) In the case of Python cooling using glycol, the cooling must be sufficient to ensure that no rise in beer temperature occurs between the coldroom and the inlet to the chiller plate, and between the outlet of the chiller-plate and the tap.

8) Pipe-supports, hangers and straps should be used to support pythons. Tie-wraps must not be used.

9) Damage to python insulation must be avoided during installation.

10) The contractor must ensure that the quality of the insulation (materials of construction, thickness, installation standard) is such that no condensation or ice forms on water-pipe surfaces, beer-line

surfaces, or the python surface; at the interface between the python and the keg / water bath or glycol bath / chiller plate/ tap or on associated fittings. The seams and joints must be completely sealed and air-tight.

11) Pythons must always be as short as possible – ideally never greater than 30m. If python is to be greater than 30m then consideration must be given to methods of ensuring no changes in beer temperature between the chiller and the tap

12) Python route must always avoid heat sources. In particular python should never come into contact with central heating pipes, glasswashers or other heat generating appliances.

13) Pythons should preferably be run at low level where the air temperature is cooler.
14) Low points in the python should be avoided. Ideally, the python should be run in ducting so that it is supported along its full length.

15) Ducting should have an internal diameter of not less than 150mm. Underground ducting may be earthenware or PVC. Above ground ducting must be PVC.

16) Underground ducting should have sweep elbow PVC bend and access manways at awkward locations.

17) Python not installed in ducting should be supported in such a way as to minimise compression of the insulation, to avoid condensation. Support hangers and/or straps should be as wide as possible and must not be less than 30mm.Tie wraps must not be used.

18) The python should not be pulled tightly around sharp corners. Where possible corners should be negotiated by running the python through a sweep elbow PVC pipe bend.

19) It is recommended that two pythons should not be run in physical contact with each other.

20) Where more than one dispensing point is served by the same python, the python should be routed so as to terminate beyond the tap which is furthest away from the cooler.

21) Python must never be extended using connectors.

22) Pythons must not be split.

23) Python must never be left exposed to the weather, since this will result in degradation of plastic materials from solar radiation, ingress of moisture and/or mould growth etc.

24) If python is recoiled after cutting it is essential to recoil in the same direction so that the bend of the tubes are not reversed. If the bend is reversed, there is a likelihood that some of the tubes will become kinked and their overall spatial arrangement relative to the coolant tubes will be disrupted.

25) Pythons should be uncoiled and laid straight prior to installation as this makes it easier to pull through ducting. To avoid damaging the insulation pythons should not be dragged along the ground.

26) All tube ends should remain capped during storage, handling and installation of python to prevent entry of any foreign matter into tubes. After installation all spare lines must be taped up to prevent ingress of any foreign matter.

27) Ensure that all ducting is free of water and debris by using a ‘Pull-through’ rag or similar material before installing a python.

28) Before python is pulled through ducting it is recommended that the leading end is formed into a taper and tubes tightly sealed and attached to a pull-wire.

29) During the pulling of the python, personnel should be stationed at awkward points along the run to prevent stretching, tearing or compression of the insulation.

30) After installation of python in ducting, all remaining openings in the ducting must be properly sealed to exclude vermin and insects. Fibreglass materials are recommended for this purpose.

31) Tubing and python should always be cut square using a suitable tube cutters or a guillotine designed for the purpose. Saw cutting must not be used to avoid swarf getting into tubing. Saw cut ends are unsuitable for use with push in fittings.

4. SPECIFICATION: KEG BOXES FOR DISPENSING OF DRAUGHT PRODUCT

Cold Room & Python systems will continue to be the preferred storage option and must be used where outlet volume is greater than 10 kegs per week. Storage options range now extended to include approved Kegbox systems that can accommodate between two and ten kegs and max. of 5 taps.

The following is a list of guidelines to cover the installation of a Kegbox system:

- A Kegbox system should only be installed in an ambient store outlet when it is physically impossible to install a standard cold room or a junior cold room within 30 metres of the dispense area.
- The maximum allowable distance between the Kegbox system and the dispense area should not exceed 15 metres, due to the capacity of the pump.
- The Kegbox system can be fitted with either 1 or 2 remote compressors, however the outlet should be made aware of the potential problems of running both the kegbox and cooler with only 1 compressor.
- The capacity of the keg box needs to reflect total outlet draught volume and should cater for one keg on tap plus one being chilled on standby up to a limit of 10 kegs per week.
- There should be a maximum of 5 taps (including competitors) per Kegbox system.
- A Kegbox system must not be used as an alternative to a coldroom & python system based on price.
- An integral Kegbox system must not be used as an alternative to a remote Kegbox based on price.
- A Kegbox system will not be acceptable if there is space for a walk-in Coldroom.

The specification for Kegbox systems is governed by the specification for the Conventional System in this document. The exceptions to the main specification to allow for Kegbox systems as follows.

1. *SPECIFICATION: COLD ROOMS FOR STORAGE OF DRAUGHT PRODUCT*

1.1 Cold Room Construction and Assembly

Exception: The insulated panels for a Keg Box will be manufactured using a minimum of 40mm of high density polyurethane* foam insulation.

*NB: In certain circumstances polyurethane foam may not be acceptable. Installing contractor must always check with customer that higher spec alternative material is not required (eg PIR foam).

Exception: The internal height of a Keg Box must be not less than 980mm.
Exception: One non-corroding protection rail must be fixed horizontally to protect the Keg Box walls from damage by kegs.
Exception: A wall board must be provided for the purpose of mounting Fobs. The Fobs must be mounted in the Keg Box or in a section of the system with appropriate controlled storage temperature.
Exception: Illumination by electrical means is not required for Keg Box systems.

1. 2 Cold Room Refrigeration Equipment (Direct Expansion Systems)

Exception: The fan assisted evaporator may be a “wedge type” cooler where the keg capacity of the coldroom is less than 20 kegs. The “wedge type” cooler must be selected and installed to ensure that there is adequate air movement to maintain an even temperature through the room.

Exception: The air cooled condensing unit and fan assisted evaporator may be the same unit (otherwise known as “Monobloc” system). This is only permissible if there is no other heat generating equipment (eg ice maker or integral cooler) in the area of the coldroom and if there is an adequate flow of cool ambient air at the location.

2. SPECIFICATION: COOLERS FOR DISPENSING OF DRAUGHT PRODUCT

2.1 Conventional (Ice Bank) Systems

Exception: The Keg Box system “cooler” must have a maximum of 5 coils. There is no requirement to have spare coils above the maximum allowable number of coils.

3. SPECIFICATION: PRODUCT LINE & PYTHONS

Exception: Pythons will be 5 + 2 + 2 line python.

4 ENERGY REDUCTION OPTIONS

Each installation must be designed to minimise electrical energy consumption.

The contractor must include potential energy reduction options in all quotations. The quote must state the additional cost associated with each opportunity, as well as approximate savings in running costs.

Examples of options that could be offered include the following (these opportunities are equally valid for conventional systems as for full glycol systems):

- Improved compressor capacity control (e.g. VSD, digital scroll).
- Electronic expansion valve.
- Floating condensing head pressure control.
- LED light fittings in coldrooms.
- PIR light switches for cold-rooms.
- Alarm on coldroom door to indicate “open”.
- VSD fan motors.
- VSD pump motors.
- High efficiency pump motors.
- High efficiency compressor motors.
- High efficiency fan motors.
- Desuperheater heat recovery.
- Reduce running time of coldroom fans when refrigeration system is not operating.

A pre high pressure switch before primary high pressure safety switch should be considered. To be wired to a localized alarm location or ideally fitted with a SMS remote signal.
Benefits are:

- lower running costs due to not allowing condenser to reach a critical dirty point, which in turn reduces the running amps of the compressor.
- Pre warning which results in no breakdown.
- Pre warning which will increase the life of the equipment due to never reaching critical levels as in overheating of motors and compressors.

(C) - INSTALLATION QUOTE TEMPLATE

Outlet Details					
	50lt kegs/wk	**30lt kegs/wk**			
Cold Product (4*C) Dispensed				No. of Cold Taps (4*C)	
Extra Cold Product (2*C) Dispensed				No. of Extra Cold Taps (2*C)	
Ice Cold Product (-1*C) Dispensed				No. of Ice Cold Taps (-1*C)	
Total Kegs				**Total Taps**	
No. of Dispense Areas (banks of taps)				No. of Iced Fonts to be Included	
				No. of Condensing Fonts to be Included	

New Coldroom			
Manufacturer			
Dimensions	H:	W:	L:
Panel Thickness (mm)			
No. of Doors			

New Coldroom Refrigeration	
Evaporator Type (Box or Wedge Type)	
No. of Evaporators	
Manufacturer	
Model	
Comp / Condensor Sizing (watts)	
Manufacturer	
Model	
Refrigerant Type	

Conventional Beer Cooling System			
Chiller Manufacturer			
Model			
No. of Coils			
No. of Pumps			
Pump Size (watts)			
Flip / Flop Module (Yes / No)			
Comp / Condensor Sizing (watts)			
Manufacturer			
Model			
Refrigerant Type			
Python Manufacturer			
	13 Line	9 Line	5 Line
No. of python runs			
Longest Python Run			
Total Length of Python Required			

Glycol Beer Cooling System

Glycol Cooler Manufacturer			
Model			
No. of Pumps			
Pump Size (watts)			
Flip / Flop Module (Yes / No)			
Comp / Condensor Sizing (watts)			
Manufacturer			
Model			
Refrigerant Type			
Chiller Plate Manufacturer			
Model			
No. of Plates (2 coil)			
No. of Plates (4 coil)			
No. of Plates (6 coil)			
No. of Plates (8 coil)			
Python Manufacturer			
	13 Line	9 Line	5 Line
No. of python runs			
Total Length of Python Required			
Coldroom Glycol Evaporator Manufacturer			
Model			

Glycol additional systems attached

No. of remote 2 door bottle coolers		
No. of remote 3 door bottle coolers		
No. of remote 4 door bottle coolers		
No. of food cold rooms		
Total KW allowance		

Energy Saving Options

Option	Cost	Benefit

(D) - INSTALLATION COMMISSIONING RECORD

Installation Company	
Company F Gas Registration No.	

I certify that this installation has been completed in compliance with the Drinks Ireland | Beer Cooling Specifications

Commissioning Engineer Details	**Print Name:**
	Signature:

Date of Installation / Commissioning	
Total Cost of Beer Cooling Installation	€

Outlet Details	
Outlet Name	
Outlet Address 1	
Outlet Address 2	

Temperature Delivery to Specification

Product	Degrees C	Product	Degrees C	Product	Degrees C

Calculations for Sizing

	50lt kegs/wk	30lt kegs/wk
Cold Product (4*C) Dispensed		
Extra Cold Product (2*C) Dispensed		
Ice Cold Product (-1*C) Dispensed		
Total Kegs		

No. of Cold Taps (4*C)	
No. of Extra Cold Taps (2*C)	
No. of Ice Cold Taps (-1*C)	
Total Taps	

No. of Dispense Areas (banks of taps)	
No. of Iced Fonts to be Included	
No. of Condensating Fonts to be included	

New Coldroom

Applicable (Yes / No)			
Manufacturer			
Dimensions	H:	W:	L:
Panel Thickness (mm)			
No. of Doors			
All panels and opes sealed correctly?			

New Coldroom Refrigeration	
Applicable (Yes / No)	
Evaporator Type (Box or Wedge Type)	
No. of Evaporators	
Evaporator Manufacturer	
Model	
Serial No:	

Applicable (Yes / No)	
Comp / Condensor Manufacturer	
Model	
Serial No:	
Sizing (watts)	
System COP	
Refrigerant Type	
Comp / Condensor Housing Installed	

New Conventional Beer Cooling System	
Applicable (Yes / No)	
Chiller Manufacturer	
Model	
Serial No.	
No. of Coils	
No. of Pumps	
Pump Size (watts)	
Flip / Flop Module (Yes / No)	

All coils numbered correctly	
Chart with coil number and product ID in place	

Applicable (Yes / No)	
Comp / Condensor Manufacturer	
Model	
Serial No:	
Sizing (watts)	
System COP	
Refrigerant Type	
Comp / Condensor Housing Installed	

New Pythons	
Applicable (Yes / No)	
Python Manufacturer	

	P1	P2	P3	P4	P5	P6
Lines in Python						
Length of Python (metres)						
Python Water (Glycol) Flowrate (Lt/Min)						

All pythons labelled correctly eg Bar , Lounge 1	

New Glycol Beer Cooling System	
Applicable (Yes / No)	
Glycol Cooler Manufacturer	
Model	
No. of Pumps	
Pump Size (watts)	
Flip / Flop Module (Yes / No)	
Applicable (Yes / No)	
Comp / Condensor Manufacturer	
Model	
Serial No:	
Sizing (watts)	
System COP	
Refrigerant Type	
Comp / Condensor Housing Installed	
Chiller Plate Manufacturer	
Model	
No. of Plates (2 coil)	
No. of Plates (4 coil)	
No. of Plates (6 coil)	
No. of Plates (8 coil)	
Brix reading for glycol / water in tank	
Temperature of glycol / water in tank	

Installation Check List

	Tick Box
1. Are all cables and pipework installed neatly & correctly?	☐
2. Are cable terminals tight and secure?	☐
3. Are all motors and/or equipment earthed correctly?	☐
4. Does condensate flow from drain outlet?	☐
5. Are all units free from rattles?	☐
6. Are all controllers programmed correctly?	☐
7. Are the Condensing Unit Housings fitted?	☐
8. Has the correct LED light been fitted in the coldroom?	☐
9. Is the under counter alarm fitted in accessible location in the busiest bar?	☐
10. Is the coldroom alarm fitted?	☐
11. Is the chiller / glycol tank alarm fitted?	☐
12. Have all pythons, beer lines and water/glycol lines been installed correctly?	☐
13. Are all beer connections and water/glycol connections leak free?	☐
14. Is the chiller water clean and free from contaminants?	☐
15. Has water / glycol level been adjusted following charging of pythons?	☐
16. Are all F-Gas labels completed and visible for inspection?	☐
17. 20mm hole provided in coldroom wall for fob drains?	☐
18. Have all trunking lids been fitted?	☐
19. All coils and pythons labelled correctly and chart completed accurately?	☐
20. Site left clean and tidy?	☐
21. Customer training completed?	☐
22. Has the customer signed up to preventative maintenance contract?	☐

General comments:

(D) - COMMISSIONING PROCEDURES

1. The Installation Contractor

1.1 Will install system(s) to Drinks Ireland | Beer Cooling Specification (latest version).

1.2 Will complete and sign the required installation commissioning record for presentation to the owner / management of outlet.

1.3 Will forward the signed installation commissioning record to the nominated representative of each of the Draught Product Suppliers. The signed installation commissioning record and installation checklist must be submitted within 5 working days of completion of installation.

1.4 The "Customer Sign Off" sheet must be completed (including customer signature) and submitted by the installation contractor with the "Commissioning Record" when a glycol system is installed.

The signed "Commissioning Record" along with the "Customer Sign Off" sheet should be scanned and sent as an E-mail attachment to the nominated representative of each of the Draught Product Suppliers.

2. The Representative of the Draught Product Supplier

2.1 Will visit the outlet and inspect the installation. The company representative will approve the installation provided the installation meets the required criteria as agreed prior to installation and meets the criteria detailed in the DRINKS IRELAND | BEER Cooling Specifications.

2.2 Approval following inspection of the installation by the Draught Product Supplier representative does not constitute certification that the installation fully meets the DRINKS IRELAND | BEER Cooling Specification. The contract is between the Customer and the Installation Contractor and any defects in equipment or workmanship subsequently identified must be resolved as part of that contract.

3. The financial contract is between the customer and the contractor in relation to full payment and terms associated.

The Draught Product Suppliers may contract an external examiner to carry out assessments of completed installations. These assessments will be to verify that the required standards and specifications are being met by the Installation Contractor.

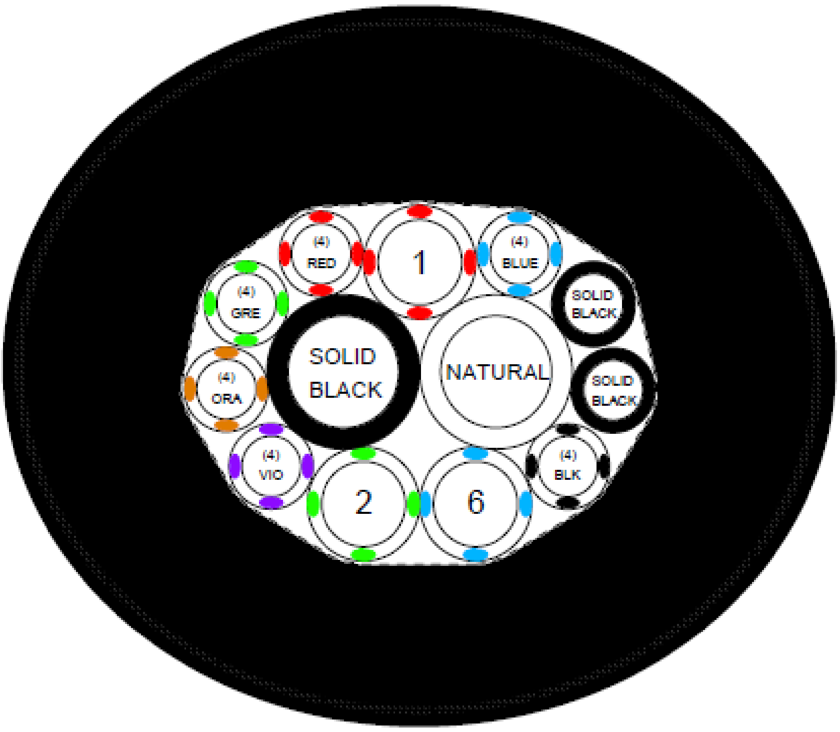
(E) – TECHNICAL MANUAL

Product Temperatures & Suggested Coils Lengths

Product	In Glass Temperature	Suggested Coil length on Ice Bank Cooler	Plate on Glycol System
Heineken	2-4ºC	12m	Extra Cold
Heineken Served Extra Cold	0ºC	12m	Ice Cold
Coors Light	1-3ºC	12m	Extra Cold
Murphy	4-6ºC	4.5m	Cold
Beamish	4-6ºC	4.5m	Cold
Paulanar	2-4ºC	12m	Extra Cold
Tiger	2-4ºC	12m	Extra Cold
Foster's	2-4ºC	12m	Extra Cold
Carling	2-4ºC	12m	Extra Cold
Guinness	4-6ºC	4.5m	Cold
Smithwicks	4-6ºC	4.5m	Cold
Smithwicks Pale Ale	4-6ºC	4.5m	Cold
Smithwicks Blonde	2-4ºC	12m	Extra Cold
Macardles	4-6ºC	4.5m	Cold
Kilkenny	2-4ºC	12m	Extra Cold
Hop House 13	2-4ºC	12m	Extra Cold
Harp	2-4ºC	12m	Extra Cold
Tuborg	2-4ºC	12m	Extra Cold
Budweiser	2-4ºC	12m	Extra Cold
Budweiser Served Ice Cold	0-1ºC	12m	Ice Cold
Carlsberg	2-4ºC	12m	Extra Cold

The suggested coil length is a guide only - the Installing company must ensure that the required "in glass temperature" is achieved.

9 + 2 + 2 LINE PYTHON



Product Lines

Tube O.D	Product	Tube Size	Colour
12.7mm x 3 no.	Stout & KIB	12.7mm X 9.5mm	Striped
9.5mm x 6 no.	Ale, Lager, Cider	9.5mm X 6.7mm	Striped

Recirculation Lines

Tube O.D	Contents	Tube Size	Colour
9.5mm	Cooling water	6.7mm X 9.5mm MDP	Black
17.4mm	Cooling water	17.4mm X 12.7mm MDP	Natural

Insulation

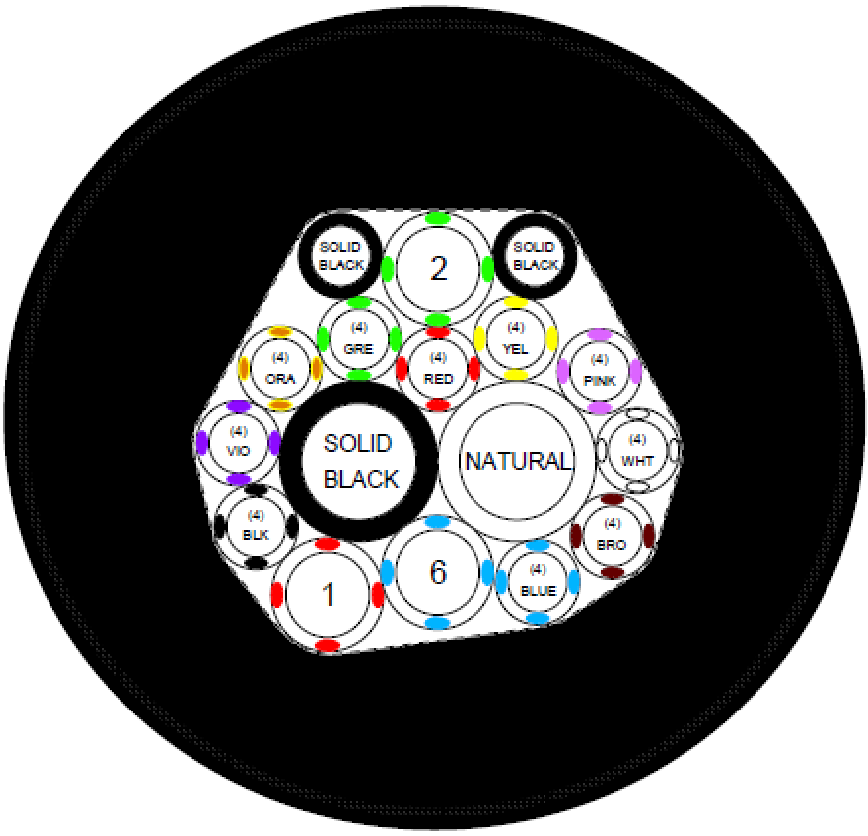
19mm wall thickness at manufacture. Minimum 17.5mm at installation.

Coverings

Food quality polyethylene barrier film

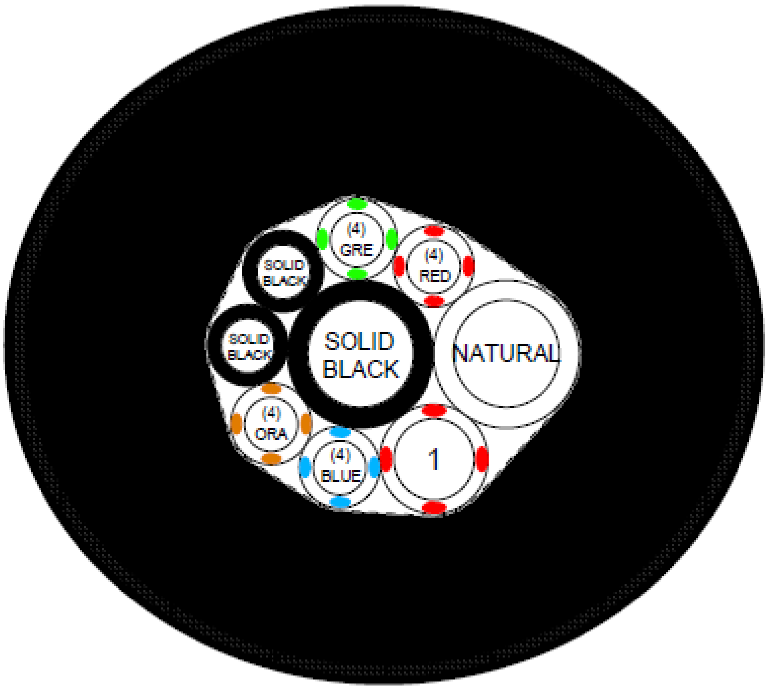
Black PVC tape (Self extinguishing to BS3924) or Sleeved Finish

13+2+2 LINE PYTHON



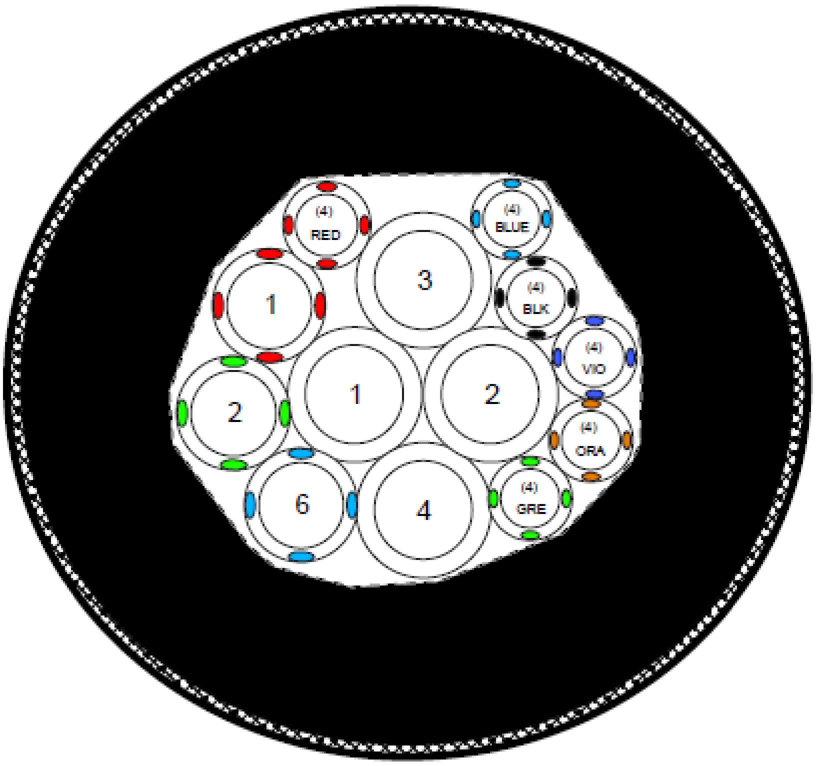
Product Lines			
Tube	**Product**	**Tube Size and Make**	**Colour**
12.7mm x 3 no.	Stout & KIB	12.7mm X 9.5mm	Striped
9.5mm x 10 no.	Ale, Lager, Cider	9.5mm X 6.7mm	Striped
Recirculation Lines			
Tube O.D	**Contents**	**Tube Size**	**Colour**
9.5mm	Cooling water	6.7mm X 9.5mm MDP	Black
17.4mm	Cooling water	17.4mm X 12.7mm MDP	Natural
Insulation			
19mm wall thickness at manufacture. Minimum 17.5mm at installation.			
Coverings			
Food quality polyethylene barrier film			
Black PVC tape (Self extinguishing to BS3924) or Sleeved Finish			

5 + 2 + 2 LINE PYTHON



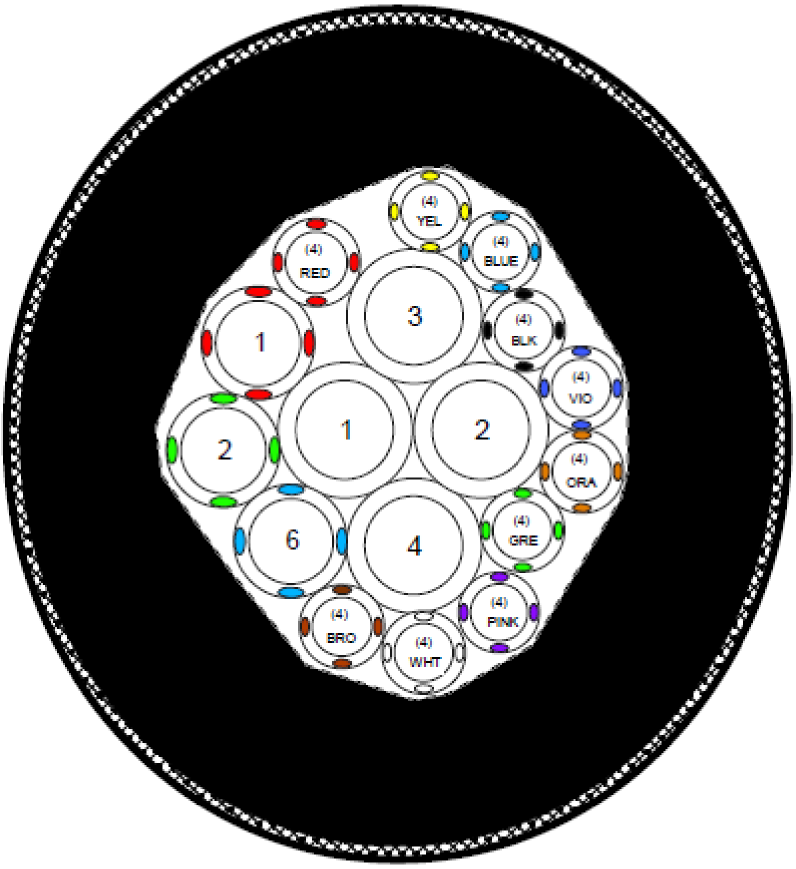
Product Lines			
Tube	**Product**	**Tube Size and Make**	**Colour**
12.7mm x 1 no.	Stout & KIB	12.7mm X 9.5mm	Striped
9.5mm x 4 no.	Ale, Lager, Cider	9.5mm X 6.7mm	Striped
Recirculation Lines			
Tube O.D	**Contents**	**Tube Size**	**Colour**
9.5mm	Cooling water	6.7mm X 9.5mm MDP	Black
17.4mm	Cooling water	17.4mm X 12.7mm MDP	Natural
Insulation			
19mm wall thickness at manufacture. Minimum 17.5mm at installation.			
Coverings			
Food quality polyethylene barrier film			
Black PVC tape (Self extinguishing to BS3924) or Sleeved Finish			

9 + 4 LINE PYTHON (Glycol)



Product Lines			
Tube	**Product**	**Tube Size and Make**	**Colour**
12.7mm x 3 no.	Stout & KIB	12.7mm X 9.5mm	Striped
9.5mm x 6 no.	Ale, Lager, Cider	9.5mm X 6.7mm	Striped
Recirculation Lines			
Tube O.D	**Contents**	**Tube Size**	**Colour**
15mm X 4	Glycol / Water Mix	15mm X 11.5mm MDP	Natural
Insulation			
19mm wall thickness at manufacture. Minimum 17.5mm at installation. Consider using 25mm thickness.			
Coverings			
Food quality polyethylene barrier film			
Sleeved Finish			

13 + 4 LINE PYTHON (Glycol)



Product Lines			
Tube	**Product**	**Tube Size and Make**	**Colour**
12.7mm x 3 no.	Stout & KIB	12.7mm X 9.5mm	Striped
9.5mm x 10 no.	Ale, Lager, Cider	9.5mm X 6.7mm	Striped
Recirculation Lines			
Tube O.D	**Contents**	**Tube Size**	**Colour**
15mm X 4	Glycol / Water Mix	15mm X 11.5mm MDP	Natural
Insulation			
19mm wall thickness at manufacture. Minimum 17.5mm at installation. Consider using 25mm thickness.			
Coverings			
Food quality polyethylene barrier film			
Sleeved Finish			

(F) Risk Mitigation for the Operation of Glycol Systems

Additional preventative maintenance is required for glycol-based systems due to risks associated with sub-zero cooling, potential single-point of failure and potential loss of reserve cooling (ice-bank).

1. PREVENTATIVE MAINTENANCE

A mandatory six month maintenance visit is required for all glycol-based systems (full glycol and hybrid glycol systems). The system supplier (Installation Contractor) must include in their costs for a minimum of one maintenance visit to be completed six-months following commissioning. As a minimum, the following items must be covered during the maintenance visit:

- Check the level of the glycol in the bath (adjust if necessary).
- Measure the strength of the glycol in the bath (adjust if necessary).
- Check the overflow drain for indications of overflow.
- Check for condensation or ice-formation on the external surfaces of pipework, tanks and pythons.
- Clean the condenser and evaporator fins.
- Clean all surfaces of the glycol bath.
- Check all refrigeration systems for lose components or excessive noise.
- Check the refrigerant charge for each refrigeration system, and top up if necessary.
- Inspect the glycol tank:
  - Disconnect power from the tank.
  - Isolate the glycol supply and return pipes and drain down the glycol from the tank in a safe manner.
  - Inspect the evaporator coils or heat exchanger for scale or other deposits. Clean if necessary.
  - Check agitator blades (if applicable) for wear.
  - Refill the tank with the glycol solution.
  - Reconnect power to the tank.
- Check the set-point temperature for each chiller plate (where applicable).
- Check the python and pipework insulation for splitting or tears.

The system supplier (Installation Contractor) must also provide in their quote for an annual maintenance visit (which may be combined with the mandatory inspection under The F-Gas Regulation, where appropriate).

2. SERVICE LEVEL AGREEMENT

The customer must be made aware of all potential risks associated with glycol-based systems. The customer must put in place an SLA (service level agreement) with the installation contractor that reflects the increased risks that are associated with glycol-based systems.

3. CUSTOMER SIGN-OFF

The customer must acknowledge in writing that he/she fully understands the risks associated with operating and maintaining a glycol-based system, and that an adequate preventative maintenance procedure, service level agreement and staff training will be put in place to mitigate against these risks. The “Customer Sign Off” sheet must be completed and submitted by the installation contractor with the “Commissioning Record”.

(G) Customer Sign-Off

I acknowledge that it is necessary to implement a suitable preventative maintenance procedure, service level agreement and staff training program following the installation of a glycol-based system (full glycol or hybrid glycol system) due to increased risks associated with sub-zero cooling, potential single-point of failure and potential loss of reserve cooling (no ice bank).

Please tick as appropriate:

	YES	NO
The system supplier has explained the increased risks associated with glycol systems, and how best to mitigate these risks.	☐	☐
Staff will receive training about the risks associated with glycol systems, and how best to mitigate these risks.	☐	☐
The equipment contractor described several energy reduction options in their quote. The quote outlined the additional cost associated with each option, plus approximate reductions in running costs.	☐	☐
I understand that a maintenance visit within the first six-month period following commissioning is required as a minimum.	☐	☐
I received a quotation from the system supplier for annual maintenance visits.	☐	☐
I have agreed for annual maintenance visits to be carried out on the system.	☐	☐
I have an adequate service level agreement in place that mitigates against the increased risks associated with glycol systems.	☐	☐

Outlet Name: ______________________________

Customer Name (Printed): ______________________________

Customer Signature: ______________________________

Installation Contractor: ______________________________

Name of Representative
from Installation Contractor (printed): ______________________________

Signature of Representative
from Installation Contractor : ______________________________