# Section 6.1 HACCP - Beer

6.1.1 Product Description - Beer

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| **Product Name:** | Beer |  |
| **Description** | Beer is a fermented beverage made by the yeast fermentation of an aqueous extract of malted or unmalted cereals, or both in the presence of hops; may have any of the following added during production: cereal products or other sources of carbohydrate, sugar, salt and/or herbs and spices. | |
| **Variant Examples** | Ale, Lager, Bitter, Wheat Beer, Porter, Pilsner, Stout, Sour Beer, Helles, Braggot | |
| **Product use** | Direct consumption  Culinary use | |
| **Intended customers** | General public – Adults  (Not intended for children and pregnant women) | |
| **Potential for Abuse** | Negligible; products are shelf stable.  Spoilage, mainly due to yeasts or moulds, or *Lactobacillus* species, may occur if packaging integrity breached - this would render the product unsaleable. | |
| **Ingredients** | Water, malt, hops & yeast, may include cereal products or other sources of carbohydrate, sugar, salt and/or herbs and spices. | |
| **Product Storage Requirements and Display Shelf Life** | Beer is shelf stable can be stored in ambient conditions. Typically for best quality it is recommend the beer is chilled prior to consuming. | |
| **Preparation and serving** | Products are all ready to eat (drink). | |
| **Packaging** | Bottle, Cans, Kegs, etc | |
| **Transport Conditions** | Ambient | |
| **Labelling** | Designed to meet the requirements of the Food Standards Code (Parts 1 and 2) – as applicable | |
| **Regulatory Limits – Food Standards Code** | Food Standards Code   * General labelling requirements * Standard 2.7.1 Labelling of alcoholic beverages * Composition of beer as specified in Standard 2.7.2 * Permitted additives and level of use as specified in Schedule 1 of Standard 1.3.1 Permitted processing aids and level of use as specified in Schedule 1 of Standard 1.3.3 | |

6.1.2 Identification of Hazards from Inputs

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| **Inputs** | **Description/Specification** | **Biological Hazard (B)** | **Chemical Hazard (C)** | **Physical Hazard (P)** |
| Clean water | Complies with the requirements defined in the Food Notice - Requirements for Food Control Plans & National Programmes | None | None | None |
| Yeast and bacteria | Suitable for food use | None | None | None |
| Grain | Suitable for food use  Sourced from an approved supplier | Enteric pathogens (e.g., *Salmonella* spp.) | Residues of agricultural chemicals (e.g., pesticides, fungicides)**1** | None |
| Additives (e.g., preservatives, fining agents) | Food grade.  Permitted for use in beer and used within limits specified in standard 1.3.1 of the Food Standards Code. | None | Sulphite**2**  Allergen’s from fining agents with animal protein derivatives**3** | None |
| Processing aids (e.g., enzymes, gases) | Permitted for food use as specified in Standard 1.3.3 of the Food Standards Code. | None | None | None |
| Spices | Food grade | Bacterial pathogens (e.g., *Salmonella* spp., *Bacillus* spp., *Clostridium* spp.) | None | None |
| Fermentable adjuncts e.g., sugar, honey | Food grade | Bacterial pathogens (e.g., *Clostridium* spp.) | None | None |
| Flavourings | Food grade | None | None | None |
| Gas | Food grade (may be generated on-site) | None | None | None |
| New bottles, cans, closures, barrels | Food grade | None | None | None |
| Used (reuse) bottles, kegs, wine barrels | Sanitised | Bacterial pathogen | Chemical or non-food suitable residues | Foreign matter (e.g., metal) |

1. Grains may contain residues of agricultural chemicals, but grain that is sourced from suppliers that comply with good agricultural practices (GAP) have been considered to meet the requirements of the Food Notice - NZ Maximum Residue Limits for Agricultural Compounds, as such chemical residues were not considered any further in the hazard analysis above.
2. Sulphite can induce asthma in susceptible individuals.
3. Residues of fining agents with animal protein derivatives (egg, fish etc) can cause allergic reaction in susceptible individuals.

6.1.3 Process Flow - Beer

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| **Inputs** | **Process Step** | **Outputs** |
|  | Purchasing |  |
| Raw Materials:   * Hops * Malted grain * Yeast * Additives / Process aids * Packaging | 2.  Receiving |  |
|  | 3.  Storing |  |
| * Grain | 4.  Milling |  |
| * Water * Grain * Hops * Processing aids * Fermentable adjuncts | 5.  Brewing [Mashing, Lautering, Kettle Boil, Blending, Heat exchanger] | * spent grain |
| * Dry hops * Gas * Yeast + nutrient * Processing aids | 6.  Fermentation | * Yeast harvested and/or waste * trub to waste |
| * Additives * Processing aids * Flavourings | 7.  Filtration, Centrifugation, Conditioning | * Trub to waste |
| * Carbon dioxide (may be generated on-site) | 8.  Carbonation |  |
| * Fining agent / filter * Packaging | 9.  Packaging |  |
|  | 10. Pasteurisation (optional) |  |
| * Virgin / wine barrels | 11.  Storage / Barrel Aging |  |
|  | 12.  Dispatch/Transport | - Packaged beer |

6.1.4 Process Hazard Analysis - Beer

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| **Process** | **Inputs** | **Hazard reasonably likely to occur on or in the product at this step** | **Justification** | **Q1. Is there a control measure(s) for the hazards at this step?** | **Q2. Is this step a CCP?** |
| 1. Purchasing | All food and product contact raw materials | See Section 6.1.3 | Hazard from raw materials not meeting regulatory requirements. | Yes – The Company operates an Approved Supplier Programme. | No |
| 2. Receiving | All food and product contact raw materials | B – Enteric pathogens | Refer to 6.1.2 | Not applicable | No |
| 3. Storing | All food and product contact raw materials | B – Enteric pathogens | Hazards from poor storage methods and unclear environment. | Yes – refer Section 2.2.2 Storage of Raw Materials. | No |
| 4. Milling | Grains | B – Enteric pathogens | Hazards carried from previous step | None | No |
| 5. Brewing | Grain, Hops, Water | B – Enteric pathogens | Hazards carried from previous step | Yes – Boiling of mix in kettle will eliminate vegetative pathogens. | No |
| 6. Fermentation | Dry hops, yeast, nutrients, processing aids | None | None | Not applicable | No |
| 7. Filtration, Centrifugation, Conditioning | Fermented beer | None | None | Not applicable | No |
| 8. Carbonation | Beer, carbon dioxide | None | None | Not applicable | No |
| 9. Packaging | Beer, glass bottles, cans, kegs | P – Glass fragments | Incorrect filler operation can result in chipping | Yes – correct equipment set-up and maintenance, routine observation during filling, filtration of any affected beer. | No |
| 10. Pasteurisation | Packaged (bottles / cans) beer | None | None | Not applicable | No |
| 11. Storage / Barrel Aging | Packaged beer | None | None | Not applicable | No |
| 12. Dispatch and Transport | Packaged beer | None | None | Not applicable | No |

6.1.5 Critical Control Points

A Critical Control Point (CCP) is a step at which an identified hazard can be eliminated or reduced to an acceptable level. Control at the CCP must be linked to the achievement of an established food safety outcome (i.e., product or process criteria). A CCP must have a defined critical limit which is measurable and capable of being monitored on a real time basis so that immediate corrective action can be undertaken.

Pasteurisation as CCP – quality (shelf-life only)?

Bottle washing as CCP?– glass – considered to be met by PRP?

6.1.6 Food Safety - Beer

Beer is generally considered as intrinsically safe given appropriate brewing and hygiene conditions have been employed in its manufacture. This is due to the variety of “hurdles” that exist to achieve control of product safety both intrinsic and extrinsic. Hurdles include cooking (mashing/kettle boil), fermentation, anaerobic conditions (fermentation, carbonation), anti-microbial processes (lowering pH, acidification of malt, addition of hops, presence of ethanol, lack of nutrients), heat treatment (if post pack (in bottle or can) pasteurised) and storage conditions (typically refrigerated). Supporting these hurdles are the pre-requisite good operating practices ensuring appropriate hygiene conditions are maintained throughout the process.

Other References

125th Anniversary Review: Bacteria in brewing: The good, the bad and the ugly. F Vriesekoop, M Krahl, B Hucker and G Menz. Institute of Brewing & Distilling. *Published online in Wiley Online Library: 12 February 2013.*

<https://doi.org/10.1002/jib.49>