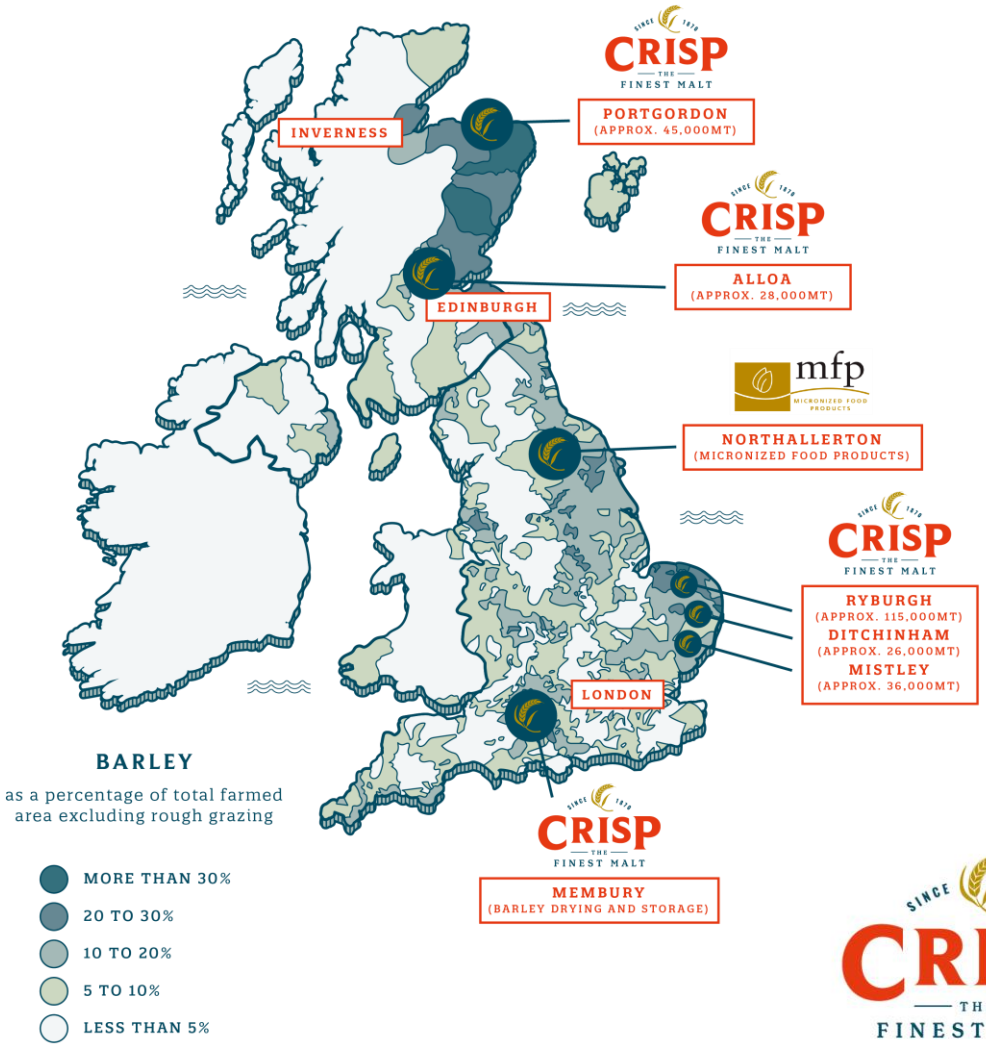
SCOTCH DISTILLING MASH PROCEDURE

GRIST FRACTIONS

Single malt Scotch whisky is made with 100% malted barley. The malt should be milled to a distillers spec which equates to 10% flour, 70% grits and 20% husk. This will ensure optimal run-off v extract performance.
The husk is vital as it will form the filter bed to facilitate free flow of wort from the mash tun. When installing your wedge-wire floor, ensure there are no gaps between plates.

BARLEY SOURCING

In Scotland, distilling malt is made from Scottish 2-row barley and is referred to as Pot Still malt. The growing area in Scotland is located close to our Portgordon maltings and many of the Scottish distilleries in Speyside. The soil and weather in this area is especially suited to producing flavourful, low protein, high extract malts. Typical varities used are Concerto and Laureate. All UK distilling varieties are Glyosidic-Nitrile (GN) free and will not form ethyl-carbamate in the still. They are also low in protein (typically between 8.5 and 10%).



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MALT SPECIFICATION

Our Premium Pot Still specification is as below. You'll notice some key parameters that are not reported on a US distilling spec, these being fermentability and Predicted Spirit Yield (PSY).

Fermentability is a measure of how fermentable the extract derived from the malt is and is determined by fermenting a laboratory wort sample using yeast. Determining the percentage fermentability allows the potential alcohol yield from the malt to be calculated. Higher protein malts will show lower levels of extract to UK distilling malts due to the higher protein content of the malt, but their percentage fermentability is broadly similar. When measuring extract content, soluble protein contributes to the extract measurement but not to the level of fermentable extract. Fermentable extract is calculated as (extract x fermentability)/100. The predicted spirit yield (PSY) is calculated by multiplying the value of fermentable extract by the empirical factor of 6.06 to obtain the PSY in litres of pure alcohol per tonne.

Example:- A malt with soluble extract (as is) of 78% and fermentability of 86%, has fermentable extract (78 x 86)/100 = 67%. The predicted spirit yield for this malt is 67 x 6.06 = 406 litres of pure alcohol per tonne

ANALYSIS	UNIT	TYPICAL ANALYSIS
MOISTURE	%	4.4
SOLUBLE EXTRACT (AS IS)	%	> 78
FERMENTABILITY	%	> 86
PSY (AS IS)	LPA/T	> 410
TOTAL PROTEIN	%	8.75 – 10
TOTAL SOLUBLE PROTEIN	%	3.5 – 4
SOLUBLE NITROGEN RATIO	NA	< 40
FRIABILITY	%	> 90
HOMOGENEITY	%	> 95
SCREENINGS < 2.2MM	%	< 1

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RECIPE FORMULATION

By beginning with the required no of litres or gallons of wash required it is possible to simply calculate the grist required. The typical ratio of liquor to grist (L/KG) are 4:1 for the first water and 2:1 for the second water to produce 5000 Litres of wash at 8.5% ABV or 1060 OG. Two examples are shown; a 1000kg grist and a 1000lb grist. These calculations are based on using Crisp Gleneagles Pot Still malt.

	KG MALT REQUIRED	LITRES OF LIQUOR REQUIRED	LITRES WASH PRODUCED
1ST WATER (4:1)	1000	4000	3500
2ND WATER (2:1)	NA	2000	1500
		TOTAL	5000

	LBS MALT REQUIRED	GLS OF LIQUOR REQUIRED	GLS WASH PRODUCED
1ST WATER (0.48:1)	1000	480	420
2ND WATER (0.24:1)	NA	240	180
		TOTAL	600

The calculation is the same for peated malt since it retains the same fermentability and extract as plain pot still malt. If you are using roasted or crystalised malts you may need to adjust your additions to provide the correct amount of wash at the required strength, bearing in mind that speciality malts do not have the same amount of sugars as plain malt.

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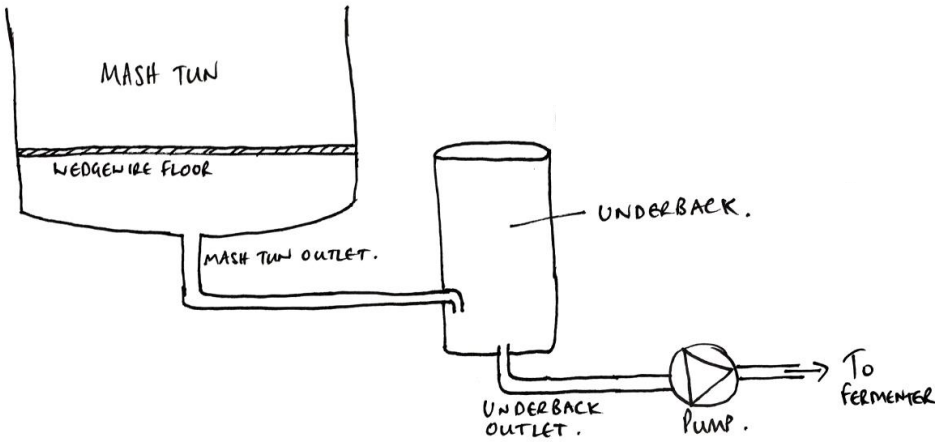
MASHING REGIME

Described below is a typical mashing regime for Scottish malt whisky production in a semi-lauter tun and washback setup. Hot liquor is produced in a separate heated vessel. Weak worts from the previous mash may or may not be employed depending on the availability of a vessel to hold the weak wort above 70C to avoid contamination.

1. Warm the hot liquor to a strike temperature of roughly 68-70 degrees C (154-158F) to ensure a mash temperature of 63.5-64 degrees C (146-147F). Water treatment with acid and salts shouldn't be necessary however, high levels of water hardness should be removed by softener.
2. Before adding the malt, fill the mash tun (underlet) with enough hot liquor to cover the plates by 2 inches. This will ensure the bed floats and it also heats the tun.
3. The malt and water should be commutated (mashed in) over the course of 20 mins, ensuring that the malt is adequately hydrated as it goes into the tun. If you can direct the flow of malt/water mix to the side of the tun or on top of the raking arm, it will reduce the entry velocity of the mash and will assist to keep the bed floated. Mashing in should take 20-30 mins.
4. Once the malt and first water have been added it is advisable to turn the rakes to set the bed. The bed can be rested for up to 1hr to allow the enzymes in the malt the necessary time to convert the starch to sugar however some Scottish distilleries will start to run off after much less than an hour since it is readily understood that conversion will continue in the fermenter.

MASHING REGIME (cont.)

5. After the rest, the wort can be recirculated back into the mash tun (vorlauf) to ensure clear wort arrives at the washback. Wort clarity can have a bearing on the character of the final spirit.
6. The wort is now drawn off from the mash tun in a controlled manner, ensuring that the run off speed is not so fast as to pull the bed down onto the plates and therefore cause a stuck mash. A simple underback or grant is used in Scottish distilling avoid your run-off pump creating a region of negative pressure under the plates and causing the bed to become compressed. This is a very simple device which creates a break between the pump and mash tun. The underback usually extends up to the full height of the mash tun and the distiller can observe the balance of sparge in the tun against the level in the mash tun to gague the differential pressure. If the level in the underback drops then it is a sign of the bed compressing and at this stage the rakes can be turned to improve run off.



7. We would typically expect to run off to commence at 30L/min for 30 mins. The clear wort will be run through a heat exchanger and chilled to the yeast pitching temperature. The yeast should be pitched as soon as some strong wort is received into the fermenter. After 1000L of collection the sparge water (2nd water) should commence and be delivered through the sparge ring at 50L/min. Run off from the mash tun should be increased to 50L/min so the sparge and run off are balanced. The 2nd water temperature should be 75 degrees C (167F). In a Scottish distillery, once 5000L of wort is collected in the washback a 3rd water would be introduced to the mash tun at 90 degrees C (194F) and this would be recovered back to a weak worts tank and kept above 70C and used as the first water for the next mash. However, this is not necessary.

GET IN TOUCH WITH OUR TEAM OF MALTSTERS

If you have a desire to dig more deeply into any of the technical aspects of this guide then please get in touch.

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