When you cut stabilization time, there’s no way you can keep beer quality the same. Only simpler.

Brewers Clarex® The same. Only simpler.
Introduction

If you're a brewmaster today you face some tough challenges. At DSM we've developed a product that helps you overcome them. Our product is Brewers Clarex® and it simplifies the stabilization process, reducing production time, costs, water and energy consumption, without impacting beer taste or quality.

What’s more, if you’re faced with ambitious efficient brewing or sustainability targets, managing surges in demand or anticipating rising energy costs or unreliable energy supply – Brewers Clarex® enables you to manage these challenges and stay true to the craft. All whilst saving you money, enhancing efficiencies and ensuring you remain at the forefront of innovation.

How Brewers Clarex® works

Brewers Clarex® relies on a proline-specific endopeptidase, an enzyme protein found in nature, which can specifically degrade (proline-rich) proteins or small proteins which are the haze-sensitive proteins in the brewing process.

Degrading these proteins prevents the formation of large complex aggregates with polyphenols which become visible haze in beer. As a result, chill haze is not formed.
I can’t meet efficiency targets without affecting first time right targets
Reduce stabilization period from 9 days to as little as 20 minutes.
Lean brewing with Brewers Clarex®

**SAVE ENERGY, REDUCE WATER USAGE, LOSE LESS BEER**
Because Brewers Clarex® avoids the need of deep cooling, brewmasters can avoid this costly process and expect considerable energy savings instead. They can also reduce the water usage and because Brewers Clarex® is a liquid, there’s no need for powder filtration aids (PVPP or Silica Gels). What’s more, the risk of equipment blockage and beer is removed.

**KEEP QUALITY THE SAME**
Due to the way the Brewers Clarex® enzyme works, beer flavor and quality unaffected.

**ACHIEVE FIRST TIME RIGHT**
Brewers Clarex® simplifies the filtering process. With less steps, the opportunities for problems to occur are greatly reduced.

**SIMPLIFY AND MAXIMIZE OUTPUT**
With Brewers Clarex®, there’s no need to precipitate proteins or polyphenols or bind them to synthetic stabilization agents. Time at cold temperature can be reduced or skipped. Time spent removing stabilization aids is no longer needed.
**ACHIEVE LEANER BREWING AND SAVE ON YOUR PRODUCTION COSTS**

Brewers Clarex® simplifies traditional brewing by streamlining one of the most demanding stages: beer stabilization. We call it ‘lean stabilization’.

**200 million hl of beer is already being stabilized using BC today.**
Even after 6 months of ageing, no significant differences are observed in terms of beer taste.

**CONSISTENT QUALITY**

With ‘lean stabilization’ you can reduce or even eliminate the complex cold stabilization procedure and brew to a consistently high quality. The enzyme in Brewers Clarex® only targets the haze-sensitive proteins and not the other ‘good’ proteins in the beer. So you can be certain there is no negative impact on the beer foam or taste.
Leaner Brewing

PRECISE DOSING
Because it comes in a liquid form, Brewers Clarex® allows for precise dosing and simplifies the filtering process. With fewer steps, there is less opportunity to introduce process variations or deviations, and you get more consistent, predictable outcomes. There's also less risk of oxygen being introduced, known to cause unwanted flavor formation and reduced flavor stability.

SAVE OPERATIONAL COSTS
Brewers Clarex® is effective in much smaller quantities than conventional stabilization aids. So there are secondary savings in transportation, handling and the associated energy costs. You also free up valuable space that can be used more productively.

“Brewers Clarex® is easy to use and as the stabilization happens effectively during fermentation, so brewers do not lose time”
Prof. Dr. Guido Aerts, University of Ghent

“Brewers Clarex® from DSM is likely to replace PVPP and Silicagels, partly for cost of stabilizers, but definitely to save cooling energy”
Axel G. Kristianse, Director of Scandinavian School of Brewing
To rapidly increase our supply without compromising quality requires more capacity and flexibility than we currently have.
Be ready when demand ramps up
Meet demand flexibly with Brewers Clarex®

INCREASE CAPACITY AT ANY TIME
Brewers Clarex® gives you the flexibility to meet sudden surges in demand – and better manage seasonal peaks.

NO HIGH-COST COOLING FACILITIES
With Brewers Clarex®, you can expand production without the expense of conventional stabilizing methods.

SHORTER STABILIZATION
The Brewers Clarex® enzyme works without deep cooling. This shortens the stabilization process.
MEET EXTRA DEMAND ON TIME AND WITHOUT ERROR

There are moments in the brewing season when demand ramps up. Some of these can be prepared for, such as the summer peak and various seasonal events. Other times brewers need to be able to move quickly. This is when having an easy to apply, reliable and highly predictable tool has huge advantages.

Brewers Clarex® helps you respond swiftly and easily to spikes in demand. A shorter stabilization period means you can react faster and avoid disappointing a customer who is running out of stock.

Put simply, you can increase capacity at will and with no significant extra costs involved. It also means that in the longer term you’ll be better equipped to control any kind of fluctuations in production.

THE SAME CRAFT – ONLY SIMPLIFIED

The conventional process of removing haze-sensitive proteins or polyphenols will always take time: from days to weeks. But with Brewers Clarex® that’s no longer the case.

Now you no longer need to precipitate proteins or polyphenols, or bind them to synthetic stabilization agents. What’s more, with Brewers Clarex® the time at cold temperature can be reduced or even removed. Equally, there’s no need for the additional filtration required to remove stabilization aids.

“One Brewers Clarex® customer is now able to stabilize in 20 minutes instead of the previously needed 6 days.”

Brewers Clarex® helps you respond swiftly and easily to spikes in demand. A shorter stabilization period means you can react faster and avoid disappointing a customer who is running out of stock.

Put simply, you can increase capacity at will and with no significant extra costs involved. It also means that in the longer term you’ll be better equipped to control any kind of fluctuations in production.

World Cup 2014: Britons spend £28m more on beer and cider in tournament’s first week alone

International Business Times, June 2014
Within our current brewing process we’re reaching our limits in improving on sustainable production.
Lower CO₂ and water footprint with Brewers Clarex®
Improve sustainability with Brewers Clarex®

MORE SUSTAINABLE
A Life Cycle Assessment (LCA) has shown that Brewers Clarex® can lead to significant improvements in the sustainability of brewing.

REDUCE CO₂
Compared to alternatives like PVPP and silica gel, Brewers Clarex® delivers a significantly lower carbon footprint.

SAVE ENERGY
By removing the need for deep cooling, Brewers Clarex® creates a less energy-intensive brewing process.

REDUCE WASTE
With Brewers Clarex®, there is none of the waste created by the conventional stabilization process.
Sustainability

MEET YOUR SUSTAINABILITY TARGETS

To ensure a sustainable future, the manner of production in the world needs to change. When it comes to the brewing industry – Brewers Clarex® provides a better way forward.

“Every profession bears the responsibility to understand the circumstances that enable its existence.”

Robert Gutman

Don’t just take our word for it: Our Life Cycle Assessment (LCA) has shown that the use of Brewers Clarex® can lead to significant improvements in the sustainability of brewing.

A comparison of its environmental impact relative to alternatives like PVPP and silica gel revealed a significantly lower carbon footprint (levels of CO₂ equivalents), as well as savings by reducing stabilization time, cooling steps and the use of water, energy and raw materials.

LOWER YOUR ENERGY

Because Brewers Clarex® avoids the need of deep cooling, brewers can avoid this costly process and expect considerable energy savings instead.

REDUCE YOUR WASTE

With Brewers Clarex® you no longer have the waste generated by conventional stabilization processes. So that waste no longer needs to be managed and disposed of. You cut down on wasted beer as well, which in conventional stabilization can amount to as much as 1% of your volume.

Stop wasting as much as 1% of your total beer volume.
There’s no way you can avoid the pressure when energy costs continue to increase.
Cut the cost of expensive energy
NO NEED FOR DEEP COOLING
Brewers Clarex® creates a less energy-intensive brewing process.

NO ADDITIONAL INVESTMENT
With Brewers Clarex® you can be less reliant on energy without investing in new technology.

LESS IMPACT FROM ENERGY FALL-OUTS
Brewers Clarex® reduces vulnerability to power cuts.

Reduce the need for energy
Energy

**LOOK AT WHAT YOU SAVE WHEN YOU STOP DEEP COOLING**

Brewers Clarex® creates a less energy-intensive brewing process. So you save on equipment like compressors, heat exchangers and the energy costs of running them. The total energy saved can amount to as much as 6%.

**High power cut in India: 600 million without electricity in ‘biggest ever blackout’**

The Telegraph (UK), Oct 31, 2015

**NO ADDITIONAL INVESTMENT**

In the future, there may be a time when you need to expand your business or build a new brewery to take advantage of opportunities like market growth in the developing world.

But conventional stabilizing methods come with a major expense. There’s the additional cost of cooling machinery as well as the facilities needed to keep a large volume of beer at an exact temperature including compressors and heat exchangers. Additionally you need to use more water for rinsing and you may also need to have ammonia on site, and so on.

“There is a more than 50% chance that the country’s energy grid will suffer a total collapse soon”

South Africa

**PUTTING YOU IN CONTROL**

Then there are energy considerations. In some areas of the world, energy supply can be unreliable and disruptions play havoc with long stabilization processes.

Brewers Clarex® minimizes these issues. It enables you to think beyond the potential problems that might have previously held you back.
Changing to Brewers Clarex® is a simple process step, and requires no major capital expenditure.

Should you require support, the brewmasters at DSM will support your team during the implementation process to ensure the highest quality is maintained throughout the stabilization process.

To find out more visit www.BrewersClarex.com or send us an e-mail at info.food@dsm.com. We are happy to help you with any questions.
INSTRUCTIONS FOR IMPLEMENTATION
Brewers Clarex® can be used with all kinds of malts and other raw materials. The product is added to cooled wort at the beginning of fermentation. The required dose rate is determined by:
– the percentage of barley malt, raw barley and/or wheat of the total grist composition
– specific gravity (Plato) of the wort at the beginning of fermentation
– shelf-life required (months)

SMALL DOSING SYSTEM
No large equipment is needed to start using Brewers Clarex®. In general, a small dosing pump, if not yet present, is installed.

Brewers Clarex® is a liquid that can be simply added in small quantities to the fermentation vessel at the start of fermentation. It does not need to be dosed proportionally to the cold wort flow into the fermentation vessel, but can be dosed at any time while filling the vessels, and proper mixing is ensured by the normal yeast formation of gaseous carbon dioxide.

DOSE LEVEL DETERMINATION
The required dose rate is determined by:
– the percentage of barley malt, raw barley and/or wheat of the total grist composition;
– the specific gravity (Plato) of the wort at the beginning of fermentation;
– the shelf-life required (months).

At 12ºPlato (final beer), we recommend 2g/Hl for 100% malt beer. Adjustments can be made for high gravity brewing, and different proportions of malt and adjuncts used. Please be assured that there are no negative effects of (incidental) over-dosing.

<table>
<thead>
<tr>
<th>Beer shelf-Life Requirement</th>
<th>6 - 9 months</th>
<th>9 - 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Material (by extract)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% Barley Malt</td>
<td>1 - 2 g/Hl</td>
<td>2 - 3 g/Hl</td>
</tr>
<tr>
<td>60% Barley Malt</td>
<td>1 - 1.5 g/Hl</td>
<td>1.5 - 2 g/Hl</td>
</tr>
</tbody>
</table>

*Recommended dose rates based on a 12ºP wort

In general, our customers are able to further optimize the dose levels after implementation, depending on the type of beer and recipes in use.
Appendix

BREWERS CLAREX (BC): GOOD FLAVOUR STABILITY WITHOUT COLD STABILIZATION
IFBM flavour pane global notations (double blind)

BC: GOOD SENSORY STABILITY WITH REDUCED COLD STABILIZATION
Sensory beer notation after 0 (light) and 6 (dark) months

0 Months | 5,63 | 6,38 | 6 | 6,25 | 6,38
5 Months  | 5,5  | 5,38 | 5,38 | 5,88 | 5,88
No significant differences are observed between PVPP & BC treatments:
– in terms of taste even at the end of shelf-life
– in terms of foam quality
THE PERFECT SOLUTION

Brewers Clarex® can be used with all kinds of malts and other raw materials and, crucially, works without the beer having to be cooled down to very low temperatures for a long period (optimal temperature is +/- 7 degrees). This drastically shortens the lagering process. Finally, there’s no waste to dispose of and no risk of equipment blockage and beer loss. Instead your beer can be sent straight for packaging.

Brewers Clarex® The same. Only simpler.