Distizym® BA-TS

Thermostable bacterial α-amylase for starch liquefaction

Product description
Distizym® BA-TS is a special enzyme for starch liquefaction and dextrinisation in distilling mashas from farinaceous raw materials. The enzyme is obtained from a specially selected strain of Bacillus licheniformis. The principal enzyme activity is based on a thermostable α-amylase (1,4-α-D-glucan-glucanohydrolase: EC.3.2.1.1).

Distizym® BA-TS liquefies and dextrinises gelatinised, digested starches in distilling mashas at a temperature range of 30 - 100 °C. Under ideal pH conditions (pH 6.5 - 6.8), Distizym® BA-TS will also briefly tolerate temperatures up to 105 °C.

Dosage
The enzyme’s field of activity extends from pH 5.0 - 9.0, the optimum being around pH 6.5 in the presence of substrate and calcium. The temperature range is 30 - 100 °C (max. 105 °C), the optimum tempeature is 90 - 95 °C in the presence of substrate, calcium and the optimum pH value.

Dosage for barley, wheat, rye and corn: 110 mL/t starch
Dosage for potatoes or other farinaceous raw materials: 150 mL/t starch

A higher or lower dosage may be necessary in the event of deviations from standard conditions.

Classic starch digestion without pressure:
Distizym® BA-TS is added to the mash tun after the raw material has been doughed or ground in. The enzyme should be diluted with cold water at a ratio of 1 : 1 before addition. It is added before or at the start of the heating phase. For a mash temperature of 90 - 95 °C, the liquefaction rest - of varying length depending on the speed of heating - must be taken before the final temperature is attained. The addition of calcium (as Ca(OH)₂, CaCl₂, etc.) at a level of 50 - 100 ppm, based on pure calcium, is recommended to first activate the enzyme and then have a stabilising effect at temperatures above 60 °C. Adjustment of the pH to 6.5 - 6.8 is recommended for mashas with pH values below 6.0. The advised calcium enrichment is achieved simultaneously if calcium hydroxide is used to raise the pH value.

Special, starch digestion process without pressure (Hohenheim dispersing mash process, etc.):
The total dosage of Distizym® BA-TS - diluted with cold water - required is added to the mash dispersing tank, or added to the decanted spent wash from wash recycling. The spent wash should have a pH value of at least pH 6.0; if it is below this, then it must be raised to pH value 6.5-6.8. A calcium content of 50 - 100 ppm, based on pure calcium, is recommended to activate and stabilise the enzyme; if it is below this, then calcium (as Ca(OH)₂, CaCl₂, etc.) should be added. Whilst the coarsely ground raw grains are discharged into the mash dispersing tank, the starch gelatinises as a result of continuous injection of steam by the dispersing machine, to release the maximum starch, with simultaneous disintegration of the mash. Dwell-time to achieve the desired degree of disintegration, controlled by hydrosizer, depends on the dispersing machine’s size, the grind and mash feed. Enzymatic liquefaction commences at 30 °C, depending on the process the final temperature is around 90 - 95 °C, at which the liquefaction rest also takes place. When the desired degree of liquefaction has been achieved, the starch is further dextrinised and saccharified using Distizym® AG or Distizym® AG ALPHA, protein hydrolysis and reduction of the mash viscosity are achieved using Distizym® PROTACID or Distizym® GL after cooling down to 65 °C.
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**Classic high-pressure steam process (Henze steamer, low-temperature process, etc.):**
After blow-off, the Distizym® BA-TS - diluted with cold water - is added directly to the hot, gelatinised and digested mash. The liquefaction rest is recommended at temperatures of 90 - 95 °C. The addition of 50 - 100 ppm calcium, based on pure calcium, is recommended to activate and stabilise the enzyme. Adjustment of the pH to 6.5 - 6.8 is recommended for mashes with pH values below 6.0. The advised calcium enrichment is achieved simultaneously if calcium hydroxide is used to raise the pH value.

**Special pressure/thermo process (jet cooker process, high-pressure cooking process according to Michurin, etc.):**
Distizym® BA-TS is diluted with cold water and added continuously. In the jet cooker method, the enzyme dilution is split, being added at the start of the heating phase and at the end of the jet cooker phase and, in the high-pressure cooking process (HPCP or “hard” starch digestion process at 5 - 6 bar or 150 - 160 °C), is added during the cooling phase after blow-off in the steam separator, at 105 °C depending on the process, or through addition to the saccharification vat in the HPCP or “hard” starch digestion process, when the mash is transferred to the saccharification vat. The mash temperature and pH value are to be coordinated for each starch digestion process (see treatment aim). The addition of 50 - 100 ppm calcium, based on pure calcium, is recommended to activate and stabilise the enzyme.

Figures 1 and 2 show the influence of temperature and pH value on Distizym® BA-TS’s enzyme activity

![Fig. 1: Influence of temperature on activity (10 % soluble starch; pH 6.5).](image1)

![Fig. 2: Influence of pH value on activity (10 % soluble starch; 90 °C).](image2)

**Storage**
Optimum storage is at 0 - 10 °C. Higher storage temperatures reduce shelf life. Temperatures above 25 °C should be avoided. Opened containers should be tightly sealed and used as soon as possible.