



ENDOZYM® Thermostep 1 & 2

Special pectic enzymes for thermovinification



→ TECHNICAL DESCRIPTION

Thermovinification (hot vinification) is a winemaking treatment that is gaining success throughout the world due to the possibility of processing red grapes quickly and with limited labour costs. This is a treatment, or several treatments, that enable the removal of colour and other compounds from the grapes by heating or cooling crushed grapes.

Advantages

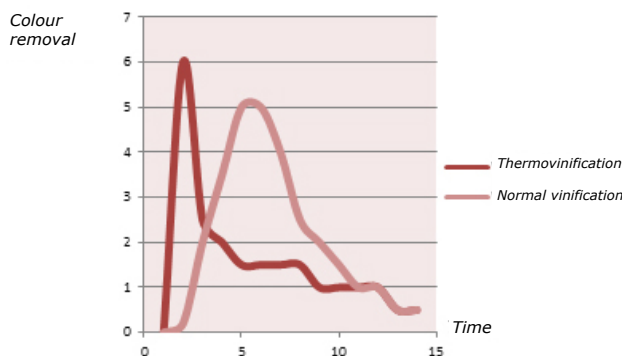
The main advantages of thermovinification are the following:

- immediate removal of the anthocyanins;
- the destruction of enzyme activity, which is essential in grapes affected by fungal diseases;
- reduction in the use of winemakers.

Operation

Thermovinification involves the rapid heating of the crushed grapes, causing the skin structure to relax and the vacuoles to expand, with the quick removal of the colouring. This technique has revealed issues however, due more than anything to a problem with the grapes and a sequence which differs from the usual process for removing the colour and polyphenol characteristics of the grapes, requiring intervention with new products that optimise the process and ensure objectives are achieved.

As can be seen in the diagram below, there is rapid colour removal, which often does not coincide with the removal of other polyphenol compounds though, and also increases the presence of very small suspended solids considerably, which must be removed before alcoholic fermentation.



After extensive research the conclusion was reached that just one clarification enzyme on its own was not sufficient to clarify such special musts, where the significant presence of solids and small bits of skin and pulp do not enable the PL and PG to work on the galacturonic acid chain and its branches.

It is for this reason that using **Endozym Thermostep 1** to 'pave the way' in conjunction with **Endozym Thermostep 2** makes it possible to improve clarification, with a positive effect on fermentation quality. The wines obtained are fresher and more fragrant, with an aroma which is more distinct compared with unclarified or poorly-clarified products, where earthy odours that do not identify the variety can be





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detected, which the market won't accept because this is often associated with fermentation anomalies. Even colour is better in enzymatic wines compared with non-enzymatic products, with a 10%-15% increase in colour with a shade that is decidedly purpler. This difference is already noticed at the end of fermentation, but it is even more noticeable during wine refinement, a phase in which wines obtained through thermovinification are often considered as being of lower quality compared with those made with conventional methods.

Endozym Thermostep 1

Enzyme with cellulase activity boosted with β -glucanase activity which facilitates rapid cellulose breakdown and also helps to free up grouped anthocyanins.

Endozym Thermostep 2

This is a mix of pectic enzymes that exploits the balance of PG and PL activity assisted by the cellulase/hemicellulase combination, accelerating the process and implementing complete degradation of the pectin and making the suspended solids easily separable, both with the decanter and flotation method, or any other clarification method.

→ COMPOSITION AND TECHNICAL CHARACTERISTICS

Endozym Thermostep 1

| Enzymatic activity | Activity/g |
|--------------------|------------|
| PL (U/g) | 3,100 |
| PE (U/g) | 350 |
| PG (U/g) | 630 |
| Total UP (U/g) | 4,080 |
| CMC (U/g) | 100 |
| β -GLU (U/g) | 150 |

Endozym Thermostep 2

| Enzymatic activity | Activity/g |
|--------------------|------------|
| PL (U/g) | 10,000 |
| PE (U/g) | 1,100 |
| PG (U/g) | 940 |
| Total UP (U/g) | 12,040 |
| CMC (U/g) | 10 |

The value is approximate and is not a specification.

PL (Pectin lyase): degrades esterified/non-esterified pectins. It is a necessary activity of AEB enzymes, given that it enables very quick clarification.

PE (Pectinesterase): assists PG in the degradation of the pectin.

PG (Polygalacturonase): only degrades non-esterified pectins. Represents enzyme activity which, in combination with PL activity, is crucial for the level of clearness in the musts and filtering ability of the wine. The combination of PL and PG activities makes it possible to obtain high yield from the first pressing very quickly.

CMC (Cellulase): a combination of several enzyme activities which, along with the pectinase, free the colouring, tannins and aromatic precursors from the grape skin.

β -GLU (β -(1-3, 1-6) Glucanase): the β -glucans present in the wines and musts degrade, which can be due to grapes being affected by *Botrytis cinerea* or yeast cells. Characterised by a high molecular weight, glucanases hydrolyse β -1,3 and β -1,6 of the 1,3-(1,6)- β -D-glucans with the release of glucose.





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The total measure of enzyme activity, which is indicated for each preparation, can be expressed as: **Total UP (U/g)**, which is the measure of enzyme activity resulting from the sum of PL, PG, PE activities measured individually.

Endozym Thermostep 1 & 2 is purified by the following activities:

CE (Cinnamyl Esterase): is an activity found in unpurified enzymes, which causes the formation of volatile phenols, compounds which lend unpleasant aromatic nuances to the wine, which, if present in high concentrations, are reminiscent of horse sweat.

→ DOSAGE

Depending on the operating temperature and grape variety:

Endozym Thermostep 1: between 2 and 4 g/hL. The thicker the skin, the higher the dose.

Endozym Thermostep 2: between 2 and 4 g/hL. The thicker the skin, the higher the dose.

→ INSTRUCTIONS FOR USE

Dilute directly in 20-30 parts of unsulphured must or demineralised water, or add to the grapes, crushed grapes or must directly. Use at the start of or during tank filling.

→ ADDITIONAL INFORMATION

INFLUENCE OF SO₂

Enzymes are resistant to SO₂ levels normally used in winemaking, however it is good practice not to put them in direct contact with sulfur solutions.

ACTIVITY CONTROL

There are various methods for evaluating enzymatic activity. A system utilized by AEB is a method of direct measure, directly linked to the concentration of the PL, PG and PE; the total of the three activities yields the Total UP per gram unity. The determination methods of pectolitic units together with the relative activity diagrams are made available to all technical personnel by AEB.

→ STORAGE AND PACKAGING

Keep **Endozym Thermostep 1** and **2** in the original sealed packaging away from light, and in a cool, dry, odour-free place at a temperature below 20°C. Do not freeze. Observe the expiry date on the packaging. Use promptly after opening.

4 kg boxes containing 2 bottles of 1 kg net/each of **Endozym Thermostep 1** and 2 bottles of 1 kg net/each of **Endozym Thermostep 2**.

10 kg net drums.

