GEA Centrifuges in Wineries

Tradition demands nothing but the best

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Content

Tradition demands nothing but the best

Dedicated winemakers count on the most sensitive product handling and minimum product losses during the process

Turning grapes into premium wines – this objective is at the heart and soul of each dedicated winemaker all over the world. Each process step has been carefully monitored so that the valuable product is not exposed to harm risks.

Careful product handling has been the tradition of winemakers for centuries. Along with it goes the maximum optimization of the individual process steps by using the most sophisticated machinery.

Centrifugal separation plays a major role in this continuous optmization cycle. It enables processing of the trub in its freshest state and juicing of the grapes immediately after receipt which helps a lot during production in high season. Centrifuges and decanters separate and clarify fast and efficiently with optimum yield.

Sophisticated technical details like the hydrosoft feed or the hydrohermetic sealing allow for the production of premium wine. Juicing grapes by a decanter means getting high quality juice from the very first grape to the very last one – top quality from the start to the end.

Centrifugal technology also helps winemakers to produce at very economical rates – making more wine, in less time, with less effort and investment.

Centrifuges and decanters in winemaking – multipurpose technologies that pay off.

The advantages at a glance

- Favourable influence on quality
- Production of clean, characteristic wines
- No impairment of taste
- Higher yield
- More uniform fermentation process
- Better wine clarification
- Fewer lees after fermentation
- Substantial extension of filter life and hence significant savings of filter aid (layers and kieselguhr)
- Savings in labour time
- Significantly reduced SO_2 requirements
- Timely separation of the fining trub (shortening of the fining time)
- Lower space requirement (storage capacity)
- Fast production of ready-to-sell wines

Solids in Must and Wine

Fast separation during the entire wine process

Solids in the juice mainly result from the grapes. Juice extraction requires the destruction of the cell structure, particularly the protective skin.

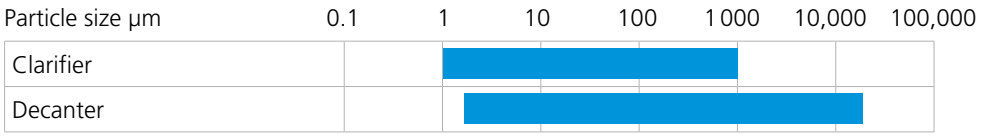
Depending on the given processing technology, more or less large cell particles enter the must. Gentle must and grape processing thus facilitates juice pre-clarification. For grape processing, the entry of microorganisms (yeasts, bacteria, moulds) clinging to the grapes should not be underestimated. The same is true for dust and sand which pollute grapes and leaves and thus also get into the juice. Mechanical harvesting particularly enhances their concentration.

The skin (exocarp) makes up about 20 percent of the whole grape, is very solid and has protective function. With red grapes, this part of the tissue contains the pigments.

The flesh (mesocarp) contains the juice, in which sugar, acids and minerals are dissolved. Its cellular tissue is particularly delicate.

Grape and must processing should be organized so as to create minimum solids content. In practice, this means that grapes or must should not be submitted to large gravitational influences in feeding or pumping.

Application range of centrifuges according to particle size



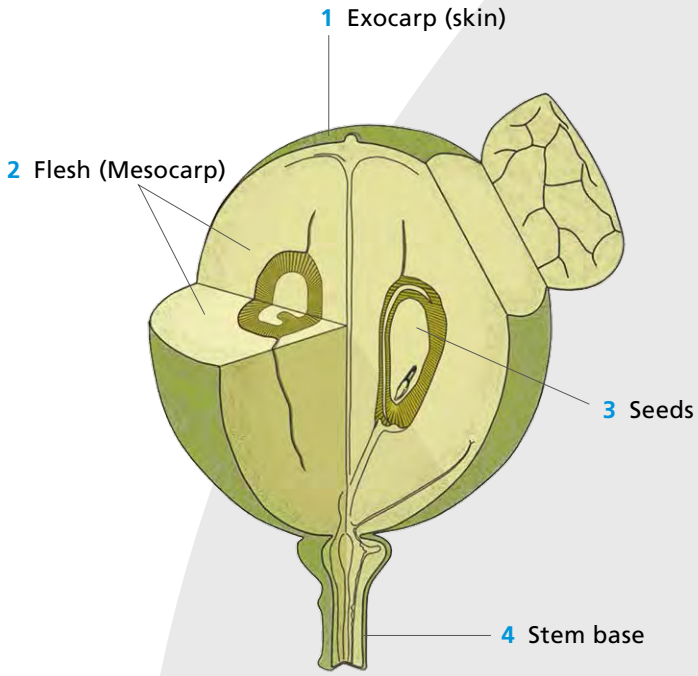
Moreover, gentle pressing systems should preferably be used with juicing.

The GEA **vinex** process dispenses with pressing. Continuous grape juicing with the help of decanters is a new way of gentle, quality-oriented wine production.

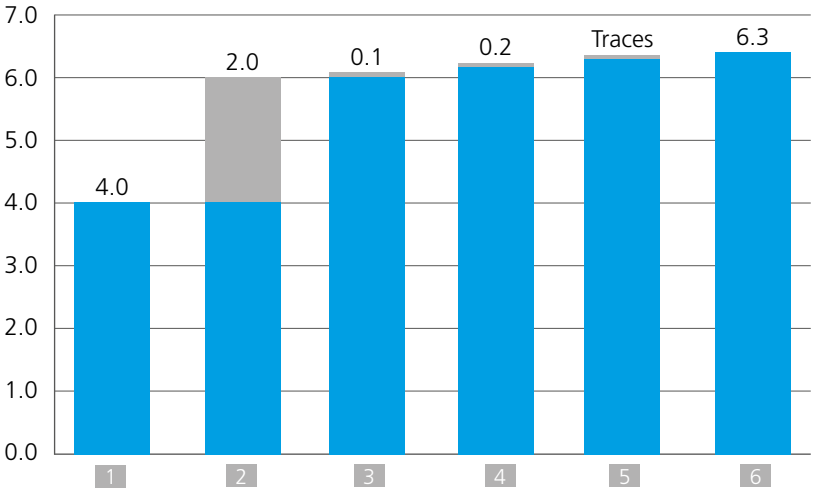
Lees consist mainly of wine yeast, bacteria, as well as accompanying solids. Additionally, colloids difficult to separate play an essential part.

These colloids may e.g. develop through

- Too intensive must processing
- Moulds on grapes
- Yeasts or bacteria metabolized during alcoholic fermentation
- Heat treatment of must

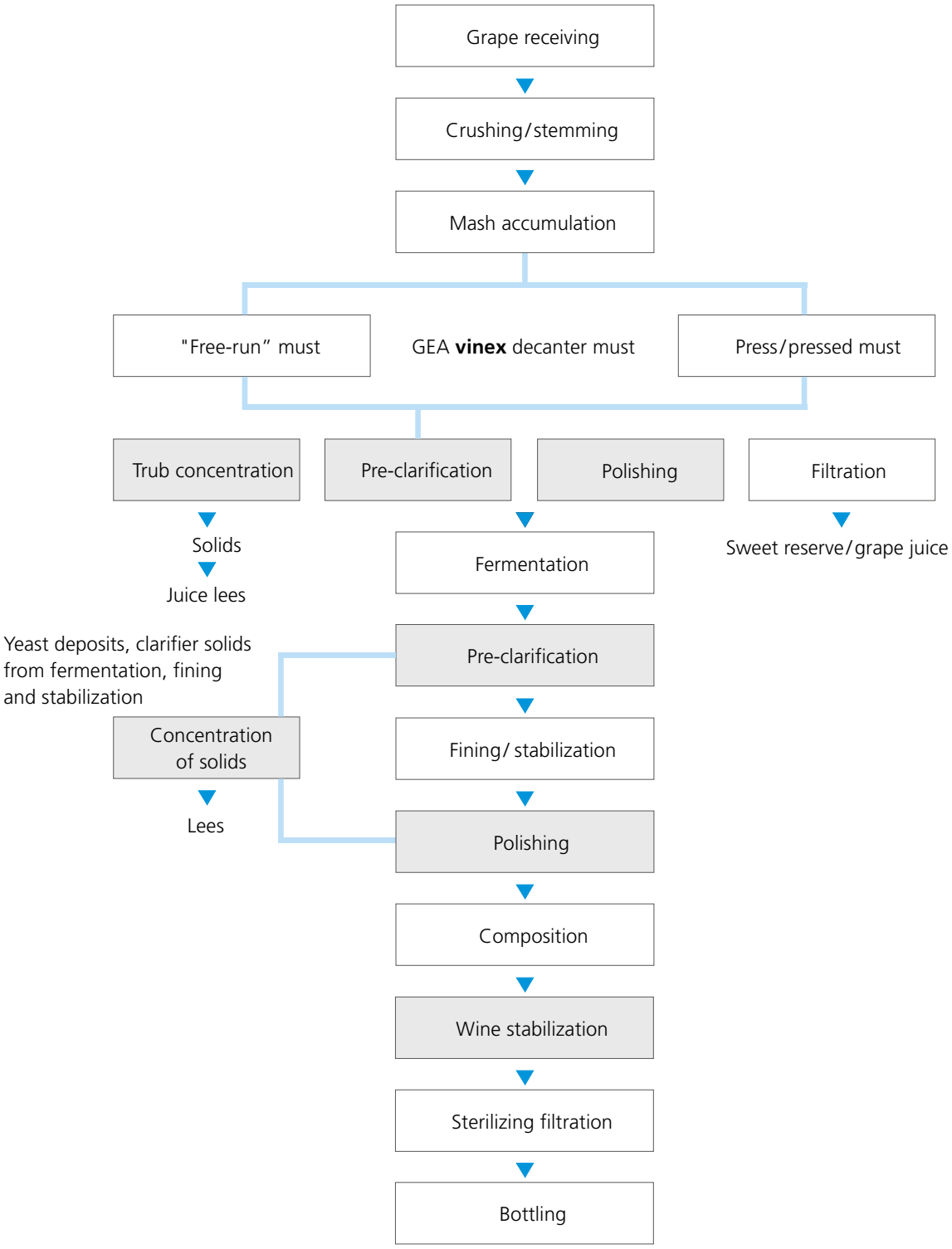


Lees development during the vinification process (centrifugally dry)



1 Must lees
2 Yeast
3 Tartrate
4 Fining agent
5 Protein/tannin/ metal precipitations
6 Total lees during wine vinification

Possible applications of clarifiers and decanters in wine production



Coarsely dispersed yeasts or bacteria are easily separated out with centrifugal force, as they have relatively large diameters and sufficient density difference compared to the liquid. Colloidal connections (pectin matters, proteins etc.), on the other hand, create difficulties in separation because of significantly smaller particle diameters and lacking density difference due to stored monohydrates. Particularly pectin matters as protective colloids may keep other solids suspended. Corresponding fining measures are advantageous for economic clarification.

Clarifiers for Wine and Sparkling Wine Production

Characteristic data

Efficiency and automation are subjected to continuous optimization in wineries.

Clarifiers play an essential role in this respect. With their high development stage in automation, they ensure a perfect clarification of must, wine and sparkling wine. They provide continuous production with varying solids content in the feed and the automatic control systems initiate the bowl ejections at optimum times.

Absolutely precise partial ejections with an equal load of solid contents may be adjusted. This is realized by a turbidity meter in the discharge, which gives the impulse for ejection once the pre-set level has been reached. Total ejections can be included. The centrifuge can be easily chemically cleaned (CIP = cleaning-in-place). Cleaning solutions are recycled through the unit in a closed system with sediment being dislodged and discharged.

Capacity data

Capacities indicated in this brochure for the different models are effective throughput capacities. They differ from the given nominal capacities which are dependent on the bowl design.

Nominal capacity

This is the maximum hydraulic capacity of a bowl.

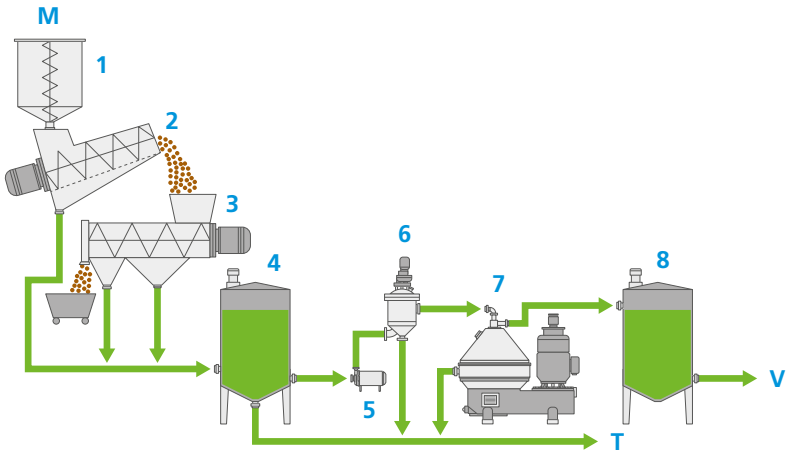
Effective capacity

This is product- and process-related and less than the nominal capacity. With a given product, capacity always depends on the desired degree of clarification. Figures expressed in "percent by vol." given in this brochure, are based on the results of a spin test in a test tube centrifuge. Separated solids amounts are, therefore, of a centrifugally dry consistency.

Effective capacity depends on the

- Size of solid particles to be separated out
- Difference in specific gravity between solids and liquid and the viscosity of the liquid (degrees brix for juice; alcohol content for wine)
- Solids content of the liquid to be clarified

To achieve the highest possible effective capacity, the bowl must have a high clarification area factor. This factor contains only relevant design values of the bowl for separating efficiency and serves as a comparison figure for similar centrifuges.



1 Mash container
2 Pre-juicer
3 Screw press
4 Must tank
5 Pump
6 Rotary brush strainer
7 Clarifier
8 Tank / Fermentation tank

M Mash
T Lees
V To fermentation

Must clarification after screw press

Must Clarification

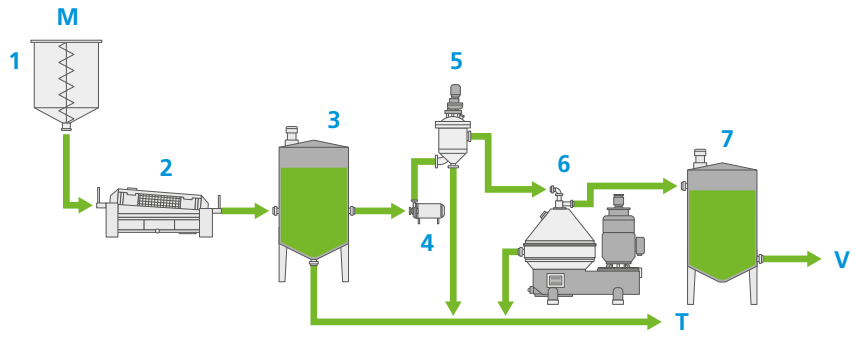
Self-cleaning centrifuges are used for clarifying the must. They are equipped with a turbidity meter to ensure an optimum clarification of the must as well as highest possible yields.

Hydrohermetic (liquid seal) clarifiers minimize oxygen pick-up in the must. The must is discharged under pressure by a centripetal pump, whereby, in addition, a stationary disc submerged in the rotating liquid creates a liquid seal.

To keep coarse solids out of the clarifier and to obtain a certain pre-clarification in the feed liquid, a rotary brush strainer is installed before the clarifier. A hydrocyclone in the clarifier feed line is recommended to remove high amounts of sandy particles in the must. This reduces erosion of the bowl's wear parts.

Advantages

- Improved quality by fast removal of solids immediately after pressing (short contact time). Undesirable solids, such as insecticides, de-acidizing sediment and others do not reach the fermentation stage
- Production of clear quality wines
- Efficient pre-clarification permits controlled fermentation with pure yeast
- Substantial savings in tank space, labour and time compared with natural tank sedimentation. In warm climates savings in cooling capacity due to the immediate removal of solids
- Continuous processing
- High yield due to minimized product losses
- Less SO_2 requirement
- Oxygen transferring enzymes are removed with solids
- Less fining agents required in the wine
- Fast removal of the solids helps to achieve a controlled fermentation process. This enhances the development of the wine (in warm climates saving in cooling capacity).
- Reduced and healthier yeast deposits
- Minimum oxygen pick-up during the process
- Easy cleaning by CIP (CIP = cleaning-in-place)



Must clarification after pneumatic press

1 Drainer tank
2 Tank press
3 Must tank
4 Pump
5 Rotary brush strainer
6 Clarifier
7 Must tank

M Mash
L Lees
V To fermentation

Storage of sweet reserve or production of grape juice

The production of juice for sweet reserve is only possible with efficient juice pre-clarification. Clarifiers for juice/must and wine clarification can also be used for this purpose. This also applies to the production of grape juice which requires a higher degree of clarification.

Capacity

In order to obtain the optimum degree of clarification with the clarifiers mentioned below for sweet reserve or grape juice production, throughput capacities given in the table for clarification of juice/must have to be reduced by one third. This solves difficult filtering problems and and saves filter aids.

The solids content in the must may vary depending on the type of pressing and quality of gapes.

The clarifier's throughput capacity can be increased by pre-treatment of the must with fining agents.

If the solids content and the specific gravity of the must are very high, throughput capacity is correspondingly lower. For each winery the correct residual solids content in clarified must can be individually adjusted by regulating throughput capacity.

GEA ecoplus		GEA hyvol® clarifiers		GEA hydry® clarifiers	
	Max. capacity* in l/h		Max. capacity* in l/h		Max. capacity* in l/h
GSC 10	600	GSE 75	8000	GSC 75	8000
GSC 18**	1000	GSE 125	14,000	GSC 95	12,000
GSC 40**	2000	GSE 200	20,000	GSC 180i	18,000
GSC 60**	8000			GSC 200	20,000
GSC 110	12,000				

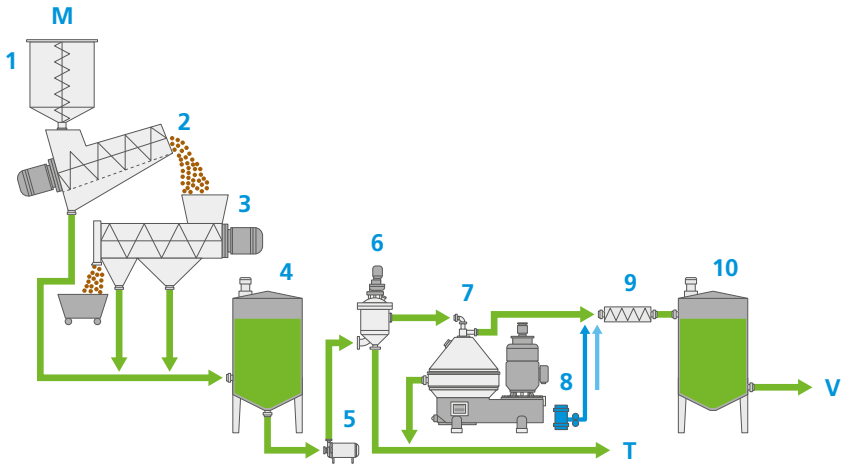
*Capacities may vary according to juice
**Machine with cast steel solids collector

Must Clarification with Inline Flotation in Clarifier Discharge

In this process, the clarifier is combined with a flotation system to clarify the must. A flotation system is installed in the outlet of the clarifier for this purpose. Sterile air and gelatine are added directly preceding the constant pressure valve. High discharge pressure of 5 – 6 bar at the outlet of the clarifier is employed, which is necessary to dissolve oxygen in adequate quantities and as small bubbles in the product. 2 – 3 g/hl of gelatine have proved to be the optimum quantity to achieve an adequate flocculation. Around 60 – 90 l/m³ has been found to be a sufficient air volume for flotation.

In the process, the fine turbid phase, remaining in suspension directly after the clarifier, is largely separated by flotation. Equally, solids capable of centrifuging which have not been extracted by the clarifier due to the higher capacity are also floated. The foam rising in the tank after depressurization is completely stabilized by the floated solids and forms a distinct separating layer to the clear phase. The separation of the turbid phase from the polished must after drainage can be conducted very accurately.

The tank is drained from the bottom towards fermentation. Stable foam remaining in the tank is sprayed out. As the turbid phase is dry and the clear phase can be drained as far as the definite separating layer, further processing of the turbid phase is unnecessary.



1 Drainer tank
2 Pre-juicer
3 Screw press
4 Must tank
5 Pump
6 Rotary brush strainer
7 Clarifier
8 Flotation system (Gelatine / air feed)
9 Flotation system (Static mixer)
10 Must tank

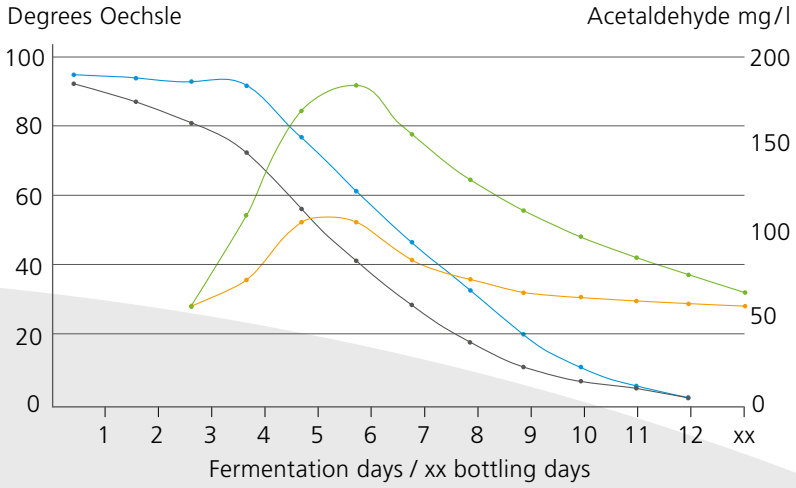
M Mash container
L Lees
V To fermentation

Must clarification with flotation in clarifier discharge

Advantages

- Consumption of gelatine and air drops by 80 percent because of the pre-clarified solids
- Foam volume drops down to 50 percent compared to conventional flotation
- Multiple process use of the clarifier – also for clarifying young wine, for fining, processing turbid phases and extracting tartrate crystals
- Easy and reliable clarification of already fermenting cold must. Problems encountered in the conventional process do not occur when using inline flotation in the discharge of the clarifier
- The clarifier can be operated at higher throughput rates during high seasons. The lower degree of clarification may be accepted as the remaining turbid phase is further reduced by flotation. This saves considerable time during vintage
- The clarifier will be run anyway with high discharge pressures which are then used for the flotation effect. Expensive pressure pumps or pressurized vessels are unnecessary and can be dispensed with
- Improved clarification standardization for must coming from different press systems with different trub contents

Diagram showing the influence of must pre-clarification on fermentation process



Influence of must pre-clarification on fermentation process and acetaldehyde formation with white wine
(from Troost 1988)

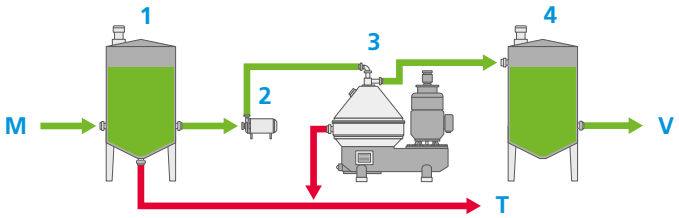
- Clarified (Oechsle)
- Turbid phase (Oechsle)
- Clarified (acetaldehyde)
- Turbid phase (acetaldehyde)

Clarification of Wine, First Racking

The same centrifuge may be used in different processes, i.e. for clarifying wine and must. Taste and stability of the wine depend substantially on the time, degree and method of clarification. Particularly turbid young wines, which are difficult to clarify by other methods, can be easily and gently clarified in the centrifuge. In order to prevent aeration of the wine, hydrohermetic clarifiers are used. These clarifiers are the ideal solution to develop fresh and elegant wines. Clarifiers reliably remove fining trub during the second stage.

Advantages

- Fast clarification is provided exactly when it is needed
- Production of high quality wines
- No flavour impairing wine which is left too long on the yeast (possible formation of H_2S)
- If a reduction of biological acid is desired, residual content can be individually adjusted by regulating throughput capacity
- Minimum air intake
- No CO_2 or bouquet losses
- Easy cleaning by CIP



Clarification of wine, first racking

1 Fermentation tank
2 Pump
3 Clarifier
4 Wine tank (fining tank)

M From fermentation tank
T Lees
V For ultrafine clarification

GEA ecoplus		GEA hyvol® clarifiers		GEA hydry® clarifiers	
	Max. capacity* in l/h		Max. capacity* in l/h		Max. capacity* in l/h
GSC 18**	3000	GSE 50	13,000	GSC 75	16,000
GSC 40**	7000	GSE 75	16,000	GSC 95	18,000
GSC 60**	16,000	GSE 100	20,000	GSC 180i	28,000
GSC 110	21,000	GSE 125	21,000	GSC 200	32,000
		GSE 180	30,000		
		GSE 200	32,000		
		GSE 300	40,000		

*Capacities may vary according to young wine
**Machine with cast steel solids collector

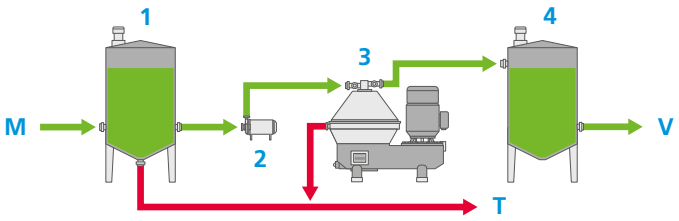
Clarification of Wine before Polishing, Second Racking (Fining Stage)

Besides clarifying must and wine during first racking , the same clarifier can be applied for polishing and second racking (fining stage). Clarification might be started after a certain reaction time / partial sedimentation in the reaction tank.

Also continuous fining inline into the feed pipe of the clarifier with corresponding reaction line can be recommended .

Advantages

- Considerably increased filter life and savings in filter aids
- Immediate removal of fining agent after reaction time
- Fast finish of ready-for-sale wines
- Improved concentration of fining agent creates smaller volume of sediments
- Minimized oxygen pick-up
- No CO_2 or bouquet losses
- Easy cleaning by CIP



1 Fining tank
2 Pump
3 Clarifier
4 Storage tank

M From fermentation/ first rack
T Lees
V To bottling

Clarification of wine before polishing, second racking (fining stage)

GEA ecoplus		GEA hyvol® clarifiers		GEA hydry® clarifiers	
	Max. capacity* in l/h		Max. capacity* in l/h		Max. capacity* in l/h
GSC 18**	1000	GSE 50	5000	GSC 75	6000
GSC 40**	3000	GSE 75	6000	GSC 95	8000
GSC 60**	6000	GSE 100	8000	GSC 180i	16,000
GSC 110	10,000	GSE 125	10,000	GSC 200	20,000
		GSE 180	18,000		
		GSE 200	32,000		
		GSE 300	40,000		

*Capacities may vary according to fining agent
**Machine with cast iron or stainless steel solids collector

Wine Polishing

Since winemaking is not a continuous process, clarifiers can be used for both pre-clarifying the must and for clarifying the freshly fermented wine.

For wines with residual sugar content a sterilizing filter should be installed behind the clarifier as precautionary measure. This clarifier has been developed for separation of the finest solid particles which previously could be removed only by filtration.

The clarifiers are designed to create a clarification area corresponding to 80 football fields, depending on the model.

Production of wine and sparkling wine

In terms of achievable clarification, the clarifier is comparable to the diatomaceous-earth filter. With easily clarified wines clarification efficiency extends even into the microbiological area of sterilizing filtration. The use of a sterilizing filter downstream is recommended, however, as a precautionary measure. Large savings in filter aids are achieved by centrifugal polishers especially with difficult wines.

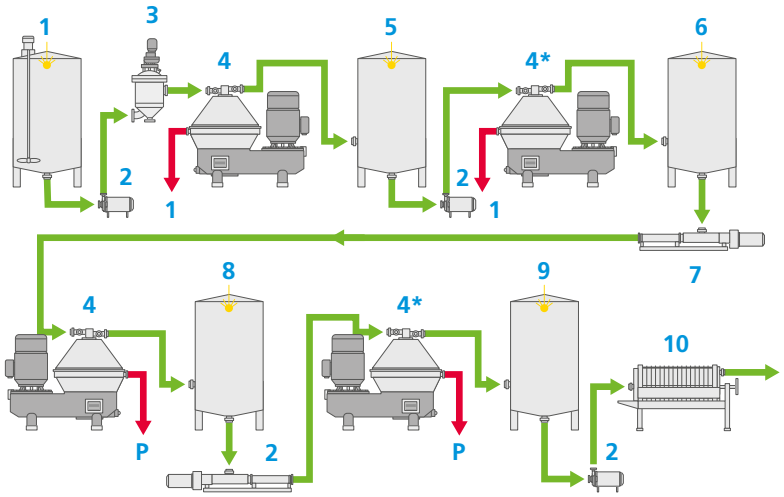
The clarifier has also proved very successful for polishing sweet reserve which must be filterable in the shortest possible time.

Advantages

- Continuous operation
- Greater yield
- No pigment losses due to absorption
- No loss of bouquet
- Minimized oxygen pick-up
- No SO_2 or CO_2 losses
- No impairment of flavour
- Use of filter aids reduced to minimum

Type	Effective capacity in wine polishing in l/h
GSE 65	7000
GSE 160	12,000
GSE 230	18,000
GSE 400	24,000

Depending on the type of wine and pre-treatment. Discharged liquid is so highly polished that it can immediately be passed through a filter (e.g. sterilizing filter).

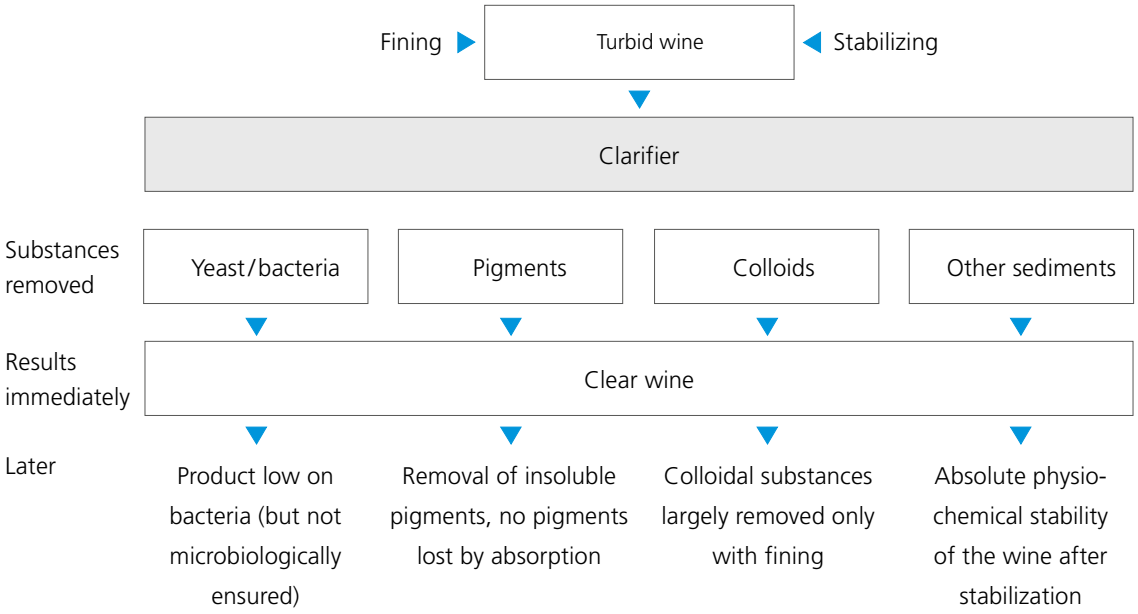


1 Must tank
2 Pump
3 Rotary brush strainer
4 Clarifier
5 Fermentation tank
6 Intermediate tank
7 Pump
8 Stabilizing tank
9 Storage tank
10 Filtration

P Solids

Multi-functionality of clarifier
* Clarifier for multifuntional use

Results obtained when clarifying turbid wine in the centrifugal field of a high-performance clarifier



Clarification of Still Wine for Sparkling Wine Production

Removal of residual yeast

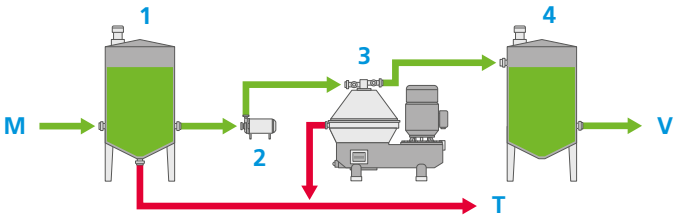
Finished still wines (champagne stock) are used to produce sparkling wines. Some of these wines still contain residual yeast which is removed by self-cleaning clarifiers.

Removal of fining trub

After that, fining of the wine is necessary to bring about precipitation of protein and iron compounds. Both clarifying stages, removal of yeast and fining agents, are carried out in accordance with the following diagram.

Advantages

- Savings in filter aids and increased filter life
- Separated fining agent is ready for disposal
- Easy cleaning by CIP



Clarification of sparkling wine

1 Wine or fining tank
2 Pump
3 Clarifier
4 Wine tank

M From fermentation tank (still wine)
T Lees processing
V To tank fermentation (sparkling wine)

GEA ecoplus		
	Max. capacity* in l/h Removal of residual yeast	Max. capacity* in l/h Removal of fining agents
GSC 18**	1500	1000
GSC 40**	3000	2000
GSC 60**	8000	4000
GSC 110	10,000	5000

*Capacities may vary according to still wine/turbid phase
**Machine with cast steel solids collector

GEA hyvol® clarifier		
	Max. capacity* in l/h Removal of residual yeast	Max. capacity* in l/h Removal of fining agents
GSE 50	7000	5000
GSE 75	8000	6000
GSE 100	10,000	8000
GSE 125	12,000	10,000
GSE 180	16,000	18,000
GSE 200	20,000	32,000
GSE 300	30,000	40,000

*Capacities may vary according to still wine/turbid phase

GEA hydry® clarifier		
	Max. capacity* in l/h Removal of residual yeast	Max. capacity* in l/h Removal of fining agents
GSC 75	8000	4000
GSC 95	10,000	5000
GSC 180i	16,000	8000
GSC 200	18,000	9000

*Capacities may vary according to still wine/turbid phase

Clarification of Sparkling Wine

Self-cleaning hydrohermetic design for high-quality sparkling wines

With bulk tank processing, clarification is carried out to produce a clear, yeast-free sparkling wine. The moment for the yeast to be separated from the raw sparkling wine is determined by process conditions, results of fermentation inspection, chemical and microbiological tests and the quality required of the sparkling wine.

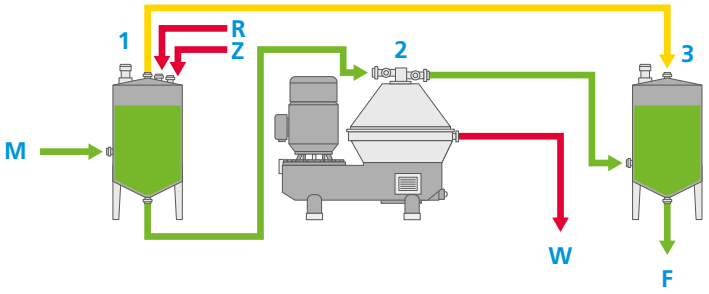
Generally, clarification is carried out shortly before bottling.

Both bulk and bottle ("transvasement" process) fermented sparkling wines can be pre-clarified and polished in self-cleaning hydrohermetic design disc-bowl centrifuges.

Subsequent filtration with plate filters, with considerable savings in filter aids, produces clear, stable sparkling wines.

Advantages

- No loss of carbon dioxide, alcohol or bouquet substance
- Pre-filtration is eliminated, only final polishing by means of a plate filter necessary
- Minimized oxygen pick-up
- Easy cleaning by CIP



Transvasement process with bottle fermentation

1 Pressurized fermentation tank
2 Clarifier, hydrohermetic design
3 Pressure tank

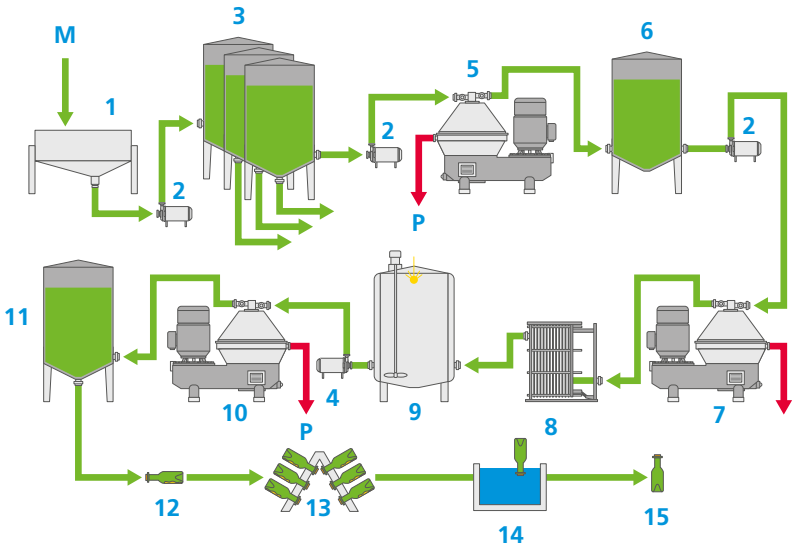
M Stabilized and polished still wine before the second alcoholic fermentation
R Pure yeast culture
W Lees
F To filtration
Z Sugar

Champagne Production

The name "Champagne" is reserved exclusively for the French wine-growing Champagne region (the mountains surrounding Reims, Marne Valley, Côte des Blancs, L'Aube, L'Aisne). Champagne consists of 2/3 red and 1/3 white grapes.

The three types of approved grapes are

- Pinot Noir, red grapes (pressed white)
- Pinot Meunier, red grapes (pressed white)
- Chardonnay Blanc, white grapes



Clarification of still wine for champagne and sparkling wine

1 Press
2 Pump
3 Must tank
4 Pump
5 Clarifier
6 Fermentation tank
7 Clarifier (to clarify still wine)
8 Cooling
9 Reaction tank (precipitation)
10 Clarifier (clarification)
11 Pressure tank
12 Addition of sugar and yeast
13 Bottle fermentation
14 Icing of bottle necks before yeast removal
17 Champagne

M Grape receiving point
P Solids

In the process shown on this page the same centrifuge can be used for pre-clarifying must and still wine.

Advantages of clarifying still wine with a clarifier

- Continuous operation
- Higher yield
- Minimized oxygen pick-up
- No impairment of flavour by filtering additives
- Production of typical still wines pure in colour
- No damage to the environment by used filtering additives

Tartrate Stabilization and Crystal Separation

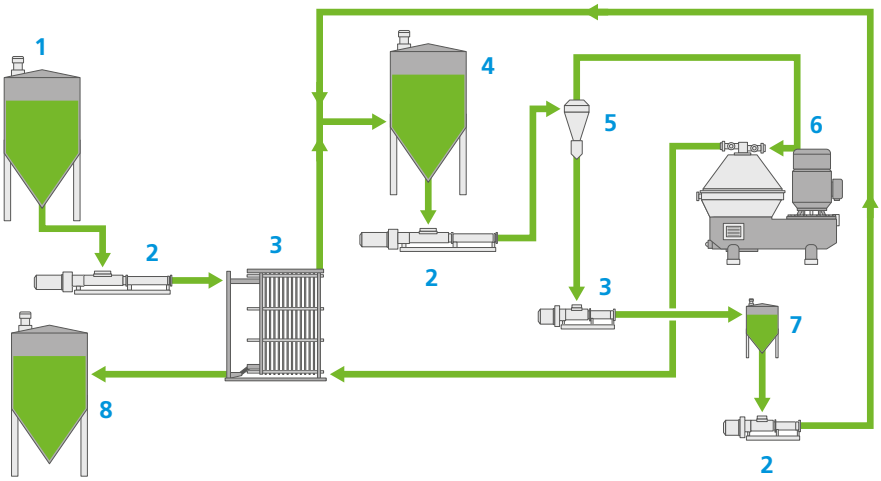
One possibility of preventing tartrate precipitation (potassium hydrogen tartrate) in bottled wines is cooling over a period of 3 to 40 days. With cooling, tartrate is precipitated and can be extracted by filtration. Only then is the wine bottled. This process is time and energy consuming as well as cost intensive.

The tartrate stabilization and extraction process offers a reliable and economic solution. This process combines reliability of a known and well-tried "contact process" with the advantages of centrifugal crystal separation. It can be used for stabilizing wine, sparkling wine and grape juice. Reaction time here is reduced to about 2 – 5 hours.

At first, the wine is cooled down to stabilization temperature. Next follows the addition of tartrate contact crystals. Intermediate storage of cooled wine with contact crystals follows in isolated tanks equipped with stirrers. The turbulence, generated according to the adjusted stirring intensity, keeps the contact tartrate floating during the whole reaction time and separation phase. After an adequate retention time (stabilization phase), separation of tartrate by hydrocyclone and clarifier (separation phase) takes place.

With this process tartrate is separated in two fractions

- In hydrocyclones, fractional extraction of contact crystals takes place as well as washing. The added contact tartrate is cleaned from residues and deposits and completely separated. Thus optimum conditions are given for frequent reusage of contact tartrate over several years (recycling)
- In clarifiers, compact grained tartrate is extracted (as well as substances susceptible to freezing – mainly protein) and must be separated. It has no abrasive properties so that the bowl is not damaged

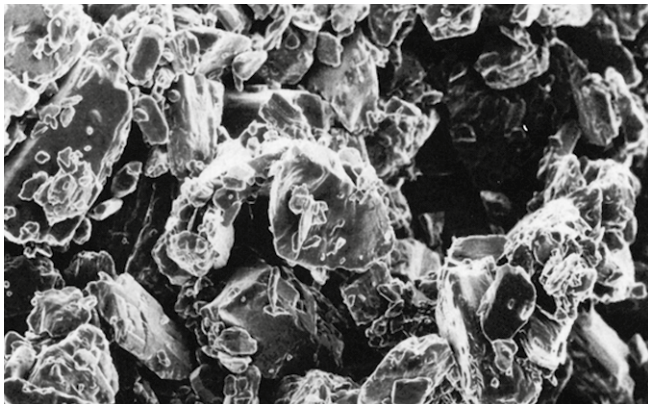


1 Tank
2 Pump
3 Cooler
4 Reaction tank
5 Hydrocyclone
6 Clarifier
7 Tartrate tank
8 Storage tank

Tartrate stabilization and separation process by GEA

Brilliant wine without any crystals

Tartrate Crystals with Varying Usage Periods



New contact tartrate.
Particle size is between 20 and 50 µm.

Contact tartrate after fourth re-usage in white wine stabilization; separation by hydrocyclone.

Contact tartrate after having used contact crystals for several months in red wine stabilization; separation by hydrocyclone.

The figures show micrographs of tartrate crystals after different usage times.

After their fourth re-usage (centre micrograph) their crystal surface develops a kind of "slate landscape". The crystals' active centres are clearly visible; they appear more frequently and are completely clean.

The micrograph on the right shows contact crystals after several months of usage in red wine stabilization. Surprisingly, the crystals here are round-shaped and have a clean surface. Moreover, contact tartrate recycled by hydrocyclones also loses its sharp edges and transforms into a globular shape in the course of time during continuous usage. At the same time it undergoes a continuous regeneration due to collection of surplus tartrate during the stabilization phase,

- through the washing effect in hydrocyclones before the separation process
- through mechanical influences like pumps, stirrers etc.

In comparison to new contact tartrate, characterized by large crystallization activity, this process of reusing contact crystals for several months leads to a visible growth of active centres coupled with clean surfaces.

High economic efficiency of the new tartrate stabilization and separation process is among others due to multiple application possibilities of the clarifier. It may also be used for classical clarification tasks in juice, wine and sparkling wine production.

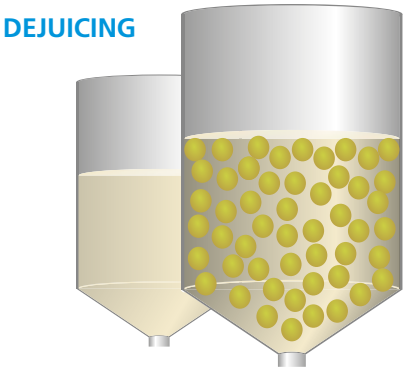
Capacity range according to plant size is 1000 to 45,000 l/h.

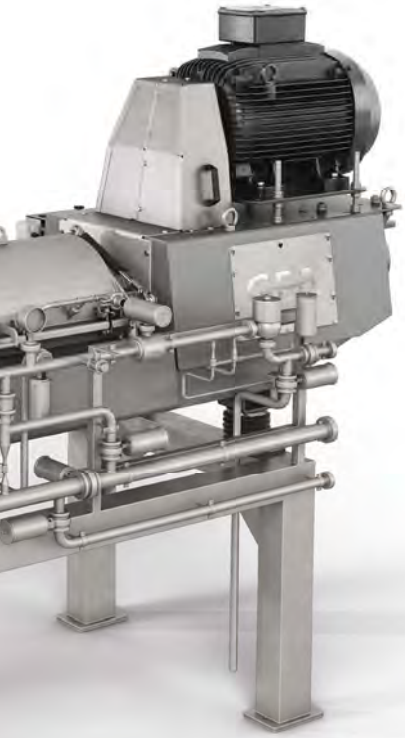
Advantages of Tartrate Stabilization Process

- Continuous operation because of a semi-continuous process
- Variable throughput capacities
- Reduced space requirements
- Centrifuge can be applied universally even for must, wine and sparkling wine clarification
- High reusage capacity of recycled tartrate
- No further treatment by process technology required
- Easy operation because of high automation
- Flexible process (clarification of red, rosé and white wines, as well as sparkling wines and grape juices)
- Saving of energy
- Final product completely meets the market's high stability requirements
- The contact process skips the time-consuming contamination phase, as the wine or sparkling wine is vaccinated with certain contact crystals. Thus, the whole contact period becomes a very efficient stabilization time

Multipurpose Decanter in Wineries

Never standing still





RECOVERING
flotation lees

RECOVERING
juice lees (maturing)

RECOVERING
wine lees (fining)

Decanters in Wineries

One decanter, five applications for the gentle and efficient processing of grapes and lees

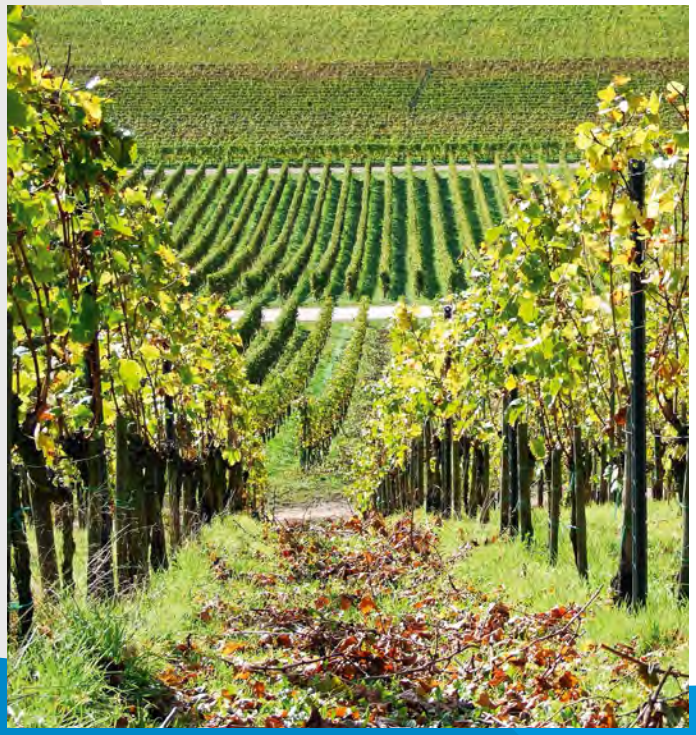
Using decanters ensures optmum yield of must and wine, as, for example, the continuously discharged solids are ready for disposal. A further important factor is savings in filter aids.

Juicing of grapes

Decanters are mainly used for clarification of liquids with high solids content. Slightly varying solids content in the product feed has little effect on the degree of clarification or separation.

Decanters find application in large wineries for

- Clarification of must
- Concentration of sediment from must tanks
- Pre-clarification of lees from fermentation tanks
- Concentration of fining agents



GEA Wine Decanter Skid

All GEA wine decanters are available as "plug & go" skids. Fully preassembled for easy installation into existing piping.

Capacity data

Capacities indicated in this brochure for the different models are effective throughput capacities.

Effective capacity

Effective capacity is product and process related. It depends on clarifiability of feed mixture, concentration of solids in the feed, permissible residual moisture content of discharged solids, and on the solids content of clarified liquid. Decanters can be largely adapted to these conditions and requirements.

Advantages of decanters

- High yield
- Continuous operation. Processing times are practically unlimited (24/7 operation)
- Automatic operation and, thereby, reduced cost of labour
- Discharged solids ready for disposal
- Savings in filter aids
- Versatile processing possibilities

Continuous Grape Juicing (Vinex)

GEA wine decanter for processing red grapes after thermovinification / thermoflash and after skin fermentation and also for white grapes

Successful producers are combining traditional winery processes and powerful new techniques in highly profitable ways. For many, the GEA wine decanter is becoming a key tool as the first decanter centrifuge specially engineered for wine juicing, clarifying and recovering. The GEA wine decanter is ideal for the efficient, fast and gentle extraction of grapes in all processes.

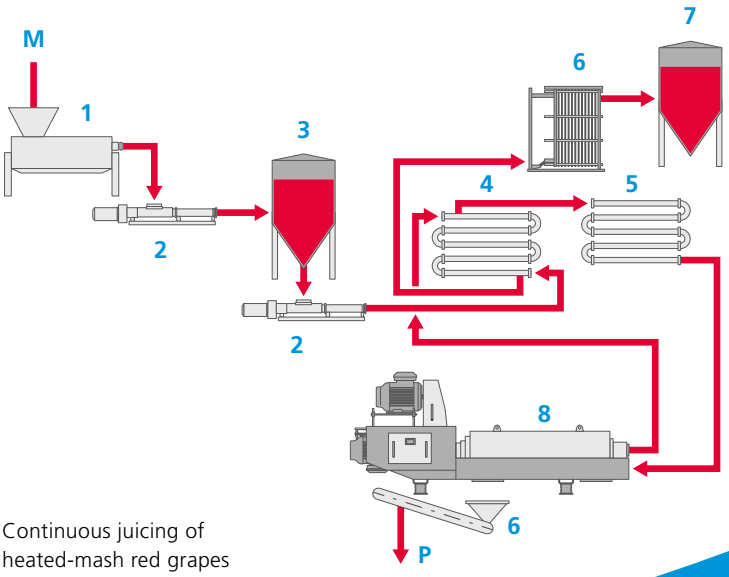
When producing red wines after thermovinification, the mash is continuously short-time heated to 80 – 82 °C for 2 – 4 minutes and then fed directly and immediately to the decanter.

A further process is the pressing of skin fermented red grapes, which are also kept in a homogenous state in the fermentation tank by slowly rotating, large, horizontal stirrers. When the desired degree of fermentation has been reached, this mash is continuously juiced in the decanter. Almost the entire yeast is also extracted in the decanter and the downstream clarifying stage can, therefore, be avoided or at least heavily reduced.

As in all other processes, the GEA wine decanter juices white grape mash continuously, smoothly and fast.

The decanter centrifugation does it all: the colour extracted from red grapes is perfect. And the taste is also perfect. The sophisticated centrifugal technology treats the product very gently, does not harm the seeds thus keeping bitter taste out of the juice. A brilliant clarification rounds off the overall perfect performance of the GEA wine decanter.

From the first to the last grape the juice from the decanter is of the highest quality comparable to free-run-juice.

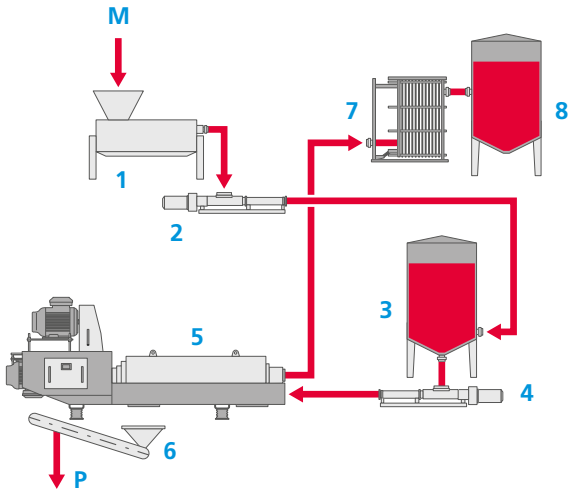


Continuous juicing of heated-mash red grapes

1 Stemmer
2 Pump
3 Intermediate tank
4 Tubular heat exchanger
5 Heater with holding section
6 Plate heat exchanger
7 Tank
8 Decanter

M Grapes
P Solids

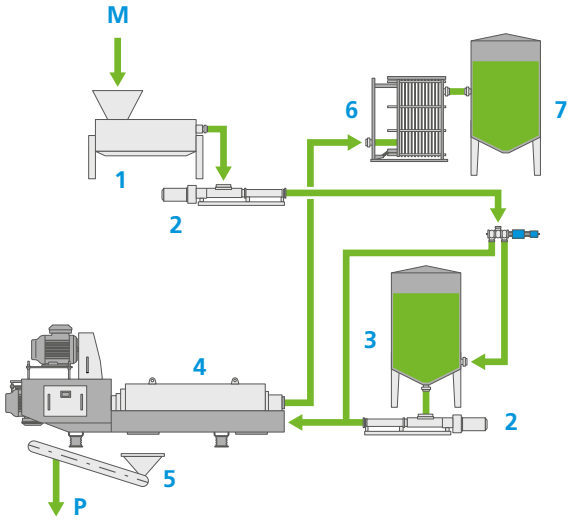
Continuous juicing of fermented-mash grapes



1 Stemmer
2 Pump
3 Mash tank
4 Pump
5 Decanter
6 Extraction of solids
7 Plate heat exchanger
8 Tank

M Grapes
P Solids

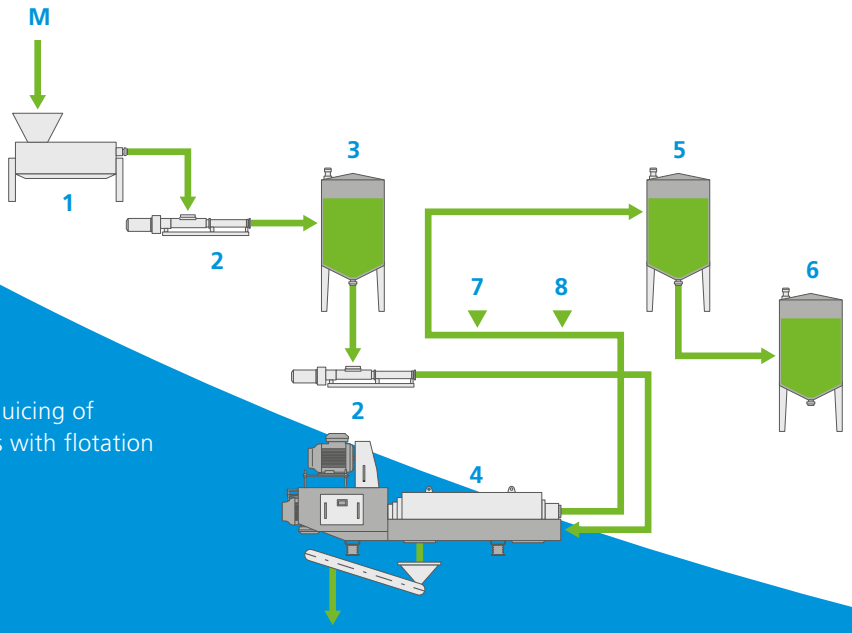
Continuous juicing of white grapes



1 Stemmer
2 Pump
3 Mash tank
4 Decanter
5 Conveyor belt
6 Plate heat exchanger
7 Tank / Fermentation tank

M Grapes
P Solids

Continuous juicing of white grapes with flotation



1 Stemmer
2 Pump
3 Mash tank
4 Decanter
5 Retention tank
6 Fermentation tank
7 Air/nitrogen addition
8 Gelatine addition
9 Conveyor belt

M Grapes
P Solids

Type	Red mash-heated/mash-fermented in t/h	White depending on the condition of the grapes in t/h
CF 3000	5 – 6	3 – 4
CF 4000	8 – 10	5 – 6
CF 5000	12 – 15	8 – 10
CF 6000	18 – 22	12 – 15
CF 7000	25 – 30	18 – 22
CF 8000	30 – 32	25 – 28

Also available as a skid design.

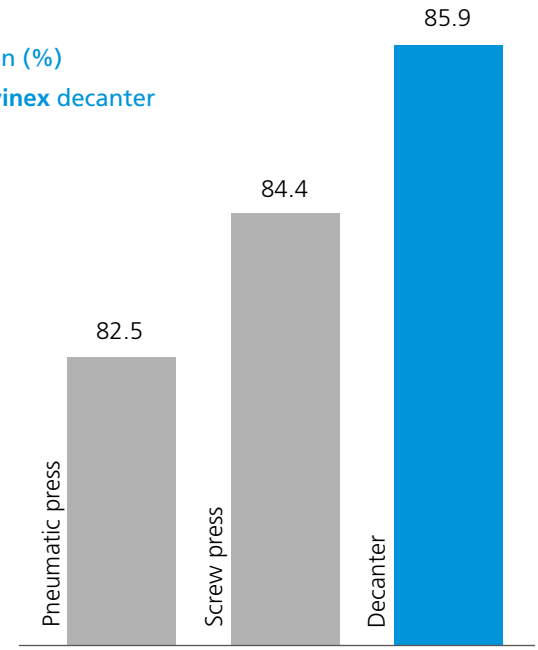
Rapid and gentle

The experts all agree. In terms of taste and quality, decanter red wines are exactly the same as wines produced with presses.
From the first to the final grape the juice quality from the decanter is comparable to free-run juice, ie., does not show any decrease in quality. And the process also results in time savings. This is because GEA **vinex** process means that it is no longer necessary for the mash to stand for several hours.

Besides a premium juice quality the GEA wine decanter series provides an easy handling within the process: the winemaker has got the freedom to process the mash immediately without stacking or after a retention time, he enjoys a perfect hygiene processing as an intregal feature of GEA decanters while the juice is clarified to the optimum.

The GEA **vinex** process has it all - perfect technology and perfect product results.

Red wine
Yield comparison (%)
Press and GEA **vinex** decanter



Thermovinification with Decanter – Red Grapes

Fewer process steps – faster processing

Juice extraction conventional	Juice extraction with decanter	Benefits
Stemmer	Stemmer	
Agitator tanks	Agitator tanks	
Heating	Heating	
Mash tanks	Decanter	Continuous process
Press	Option: Clarification	No buffer tanks, mash tanks
Clarification		Multifunctional
Fermentation	Fermentation	

10 Good Reasons for the GEA Wine Decanter

High Quality Processing of Wine

1. Gentle process

GEA cares about the essential needs of a gentle product handling. Therefore the GEA inlet system has been designed to accellerate the grapes as smoothly as possible. The result: high quality juice comparable to free-run juice from the first to the last grape.

2. Continuous operation

The **vinex** process permits a continuous method of operation in a closed system. Unwanted oxidation pick-up is minimized.

3. Top quality wines

Tannin agent and potassium content are indications of the mechanical strain imposed on the mash. With decanter wines, these parameters are identical and, in part, lower compared with wines produced with the press. The extraction time in a decanter is short. This aspect minimizes enzyme action and changes in mash constituents and quality is improved. The microbe load is also reduced due to the rapid separation of mash into juice and pomace.

4. High yield

Compared to traditional methods, decanters provide a similar or even higher yield depending on the grape variety.

5. Processing of small batches

Even very small batches can be processed in a decanter without any problems.

6. Minimal residual yeast

In mash-fermented red wine processing, almost the entire yeast is removed with the decanter. Under optimum conditions therefore, secondary clarification is not necessary or can at least be carried out with lower levels of load.

7. Hygienic processing and extremely simple cleaning

The compact enclosed system means that decanters operate under very hygienic conditions and are easy to clean within CIP. This saves time and reduces the strain imposed on the environment.

8. Flexible and reliable

Decanters are multifunctinal and can be used for the processing of various products. The optimum quantity of trub in the juice can be adjusted as required.

9. Simple and space-saving

The decanters feature a compact and space-saving design. Installation is simple, and the space requirement is low.

10. Available as pre-mounted skid

All GEA wine decanters can be obtained as a skid with perfectly premounted features, ready to go.

Clarification of Must

Depending on the pressing system in wineries and therefore depending on the solids' content, it can be useful to run a decanter for musts with high solids content. A good example is must coming from a screw press.

The must recovered from the continuous pre-juicer and screw press normally has a solids content of 8 – 15 percent by vol. This highly turbid must is reduced to approx. 1 percent by vol. by means of a decanter and is subsequently fed to the drainer must in the fermentation tank.

With the inline flotation in the discharge of the decanter the clarity can be improved. The process is similar to the use with a separator.

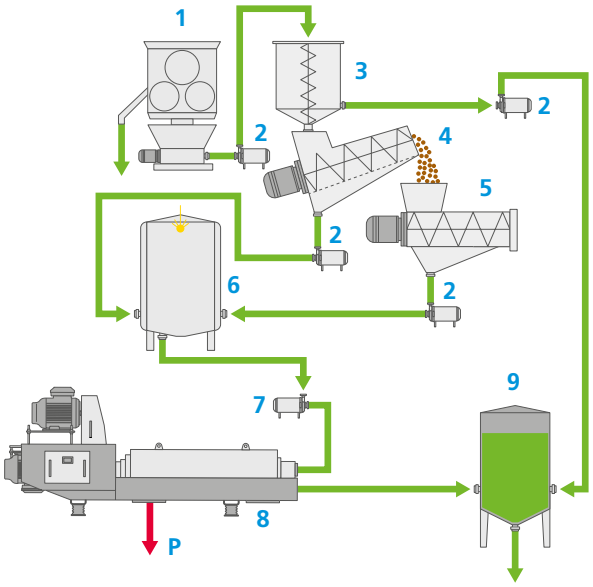
Please refer to page 8.

Type	Max. effective capacity in l/h
CF 3000	5 – 7
CF 4000	8 – 15
CF 5000	11 – 18
CF 6000	15 – 22
CF 7000	20 – 30

Also available as a skid design

Advantages

- Fully continuous processing
- Solids have a maximum dryness and are ready for disposal
- No filters required for sediment removal



1 Stemmer
2 Pump
3 Drainer tank
4 Pre-juicer
5 Screw press
6 Must collecting tank
7 Pump
8 Decanter
9 Fermentation tank

P Solids

White wine production

Red wine production

Concentration of Juice Lees, Sediment from Flotation and Wine Lees

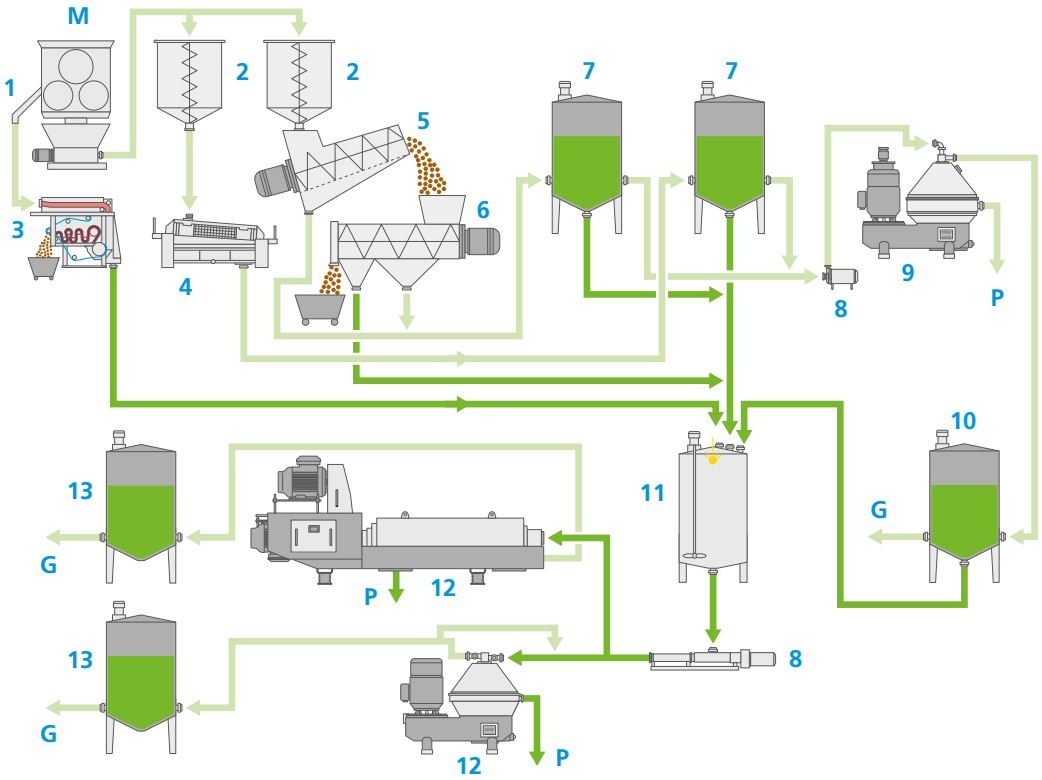
Winemakers get more juice – and sales – from the same resources if the juice sediments, coming from cold settling, are processed with a decanter. The juice is recovered and kept in the process and can be directly fermented.

The same principle applies to flotation sediment and wine lees.

The clarification can be improved by the inline dosing of fining agents into the decanter bowl.

Advantages

- Downstream filters become obsolete
- Immediate processing of resulting sediment. Retention time of sediment in collecting tank is obsolete. Must quality remains
- More wine from the same resources
- Savings in filter aids
- Solids collect ready for disposal



Concentration of sediment from must tanks

1 Stemmer
2 Pre-juicing
3 Continuous band press
4 Discontinuous tank press
5 Pre-juicer
6 Screw press
7 Must tanks
8 Pump
9 Clarifier
10 Must tank
11 Lees collecting tank
12 Decanter, alternatively clarifier, type GSC
13 Intermediate tank

M Grapes
G To fermentation
P Solids

More Juice from the same Resources

GEA ecoplus		GEA hydry® clarifiers	
	Max. capacity* in l/h		Max. capacity* in l/h
GSC 18**	400	GSC 75	2000
GSC 40**	800	GSC 95	3000
GSC 60**	2000	GSC 180i	4000
GSC 110	3000	GSC 200	5000

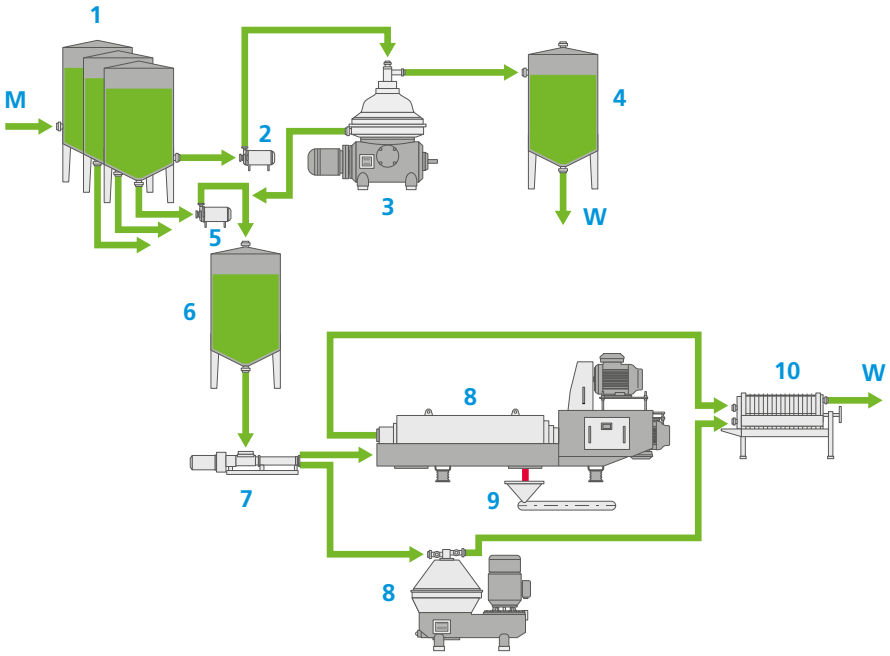
*Capacities may vary according to sediment
**Machine with cast steel solids collector

Flow rates for different winemaking processes

GEA Decanter	De-juicing		Recovery from		
	Red grape in m³/h	White grape in m³/h	juice lees in m³/h	flotaion leed in m³/h	wine lees in m³/h
CF 8000	30 – 32	25 – 28	12 – 14	6 – 7	4 – 5
CF 7000	25 – 30	18 – 22	9 – 12	5 – 6	3 – 4
CF 6000	18 – 22	12 – 15	6 – 8	3 – 4	2.5 – 3
CF 5000	12 – 15	8 – 10	4 – 5	2 – 3	1.5 – 2.5
CF 4000	8 – 10	5 – 6	3 – 4	1 – 2	1 – 1.5
CF 3000	5 – 6	3 – 4	2 – 3	0.5 – 1	0.5 – 1

Pre-clarification of Yeast from Fermentation Tanks

Although sometimes only about 50 percent of the solids can be separated out at this clarifying stage, this step is important for efficient operation of the downstream filter (e.g. rotary vacuum filter). At this stage it is most important that the yeast to be processed is still in a very fresh condition. If the yeast is already in the early stages of autolysis, clarifying efficiency of the decanter will fall drastically (the yeast will become slimy).



1 Fermentation tanks
2 Pump
3 Clarifier
4 Wine tank
5 Pump
6 Sediment collecting tank
7 Pump
8 Decanter/alternatively clarifier
9 Solids for separation
10 Filtration

M Must
W To further processing

Pre-clarification of yeast deposits from fermentation tanks

GEA ecoplus		GEA hydry® clarifiers		Decanter	
	Max. capacity* in l/h		Max. capacity* in l/h		Max. capacity*** in l/h
GSC 18**	200	GSC 20	500	CF 3000	900
GSC 40**	400	GSC 45	1000	CF 4000	1300
GSC 60**	800	GSC 75	2000	CF 6000	3000
GSC 110	2500	GSC 95	2500	CF 7000	4000
		GSC 150	4000		
		GSC 250	4500		

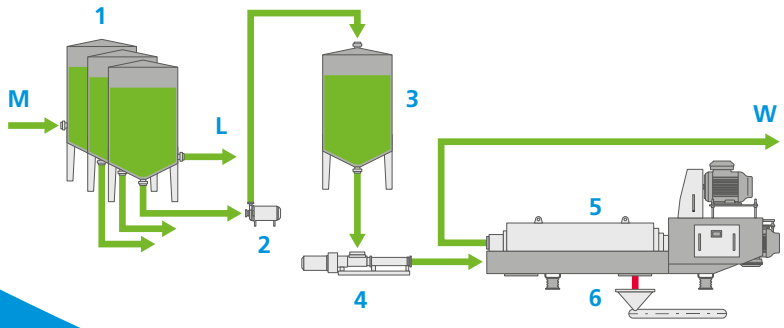
*Capacities may vary according to tank bottoms. **Machine with cast steel solids collector.
***Capacities may vary according to must.

Inline Dosing of Fining Agents into the Decanter Bowl

With this process, the efficiency of the clarification of recovered must/wine from must trub or wine lees in the decanter is improved through the continuous addition of fining agents such as gelatine directly into the decanter bowl at the same time as separation of the sediment/lees and fining trub. As such, improved performance in the decanter can be achieved with improved clarification of < 1 vol. percent solids in the discharge.
Must trub/yeast lees are therefore be processed quickly and promptly.

The must trub/yeast lees are separated with a high yield and the solid is delivered with dry substances of around > 40 percent DS.

Concentration of Trub after Fining



1 Fining tank
2 Pump
3 Lees collection tank
4 Pump
5 Decanter
6 Conveyor belt (solids ready for disposal)

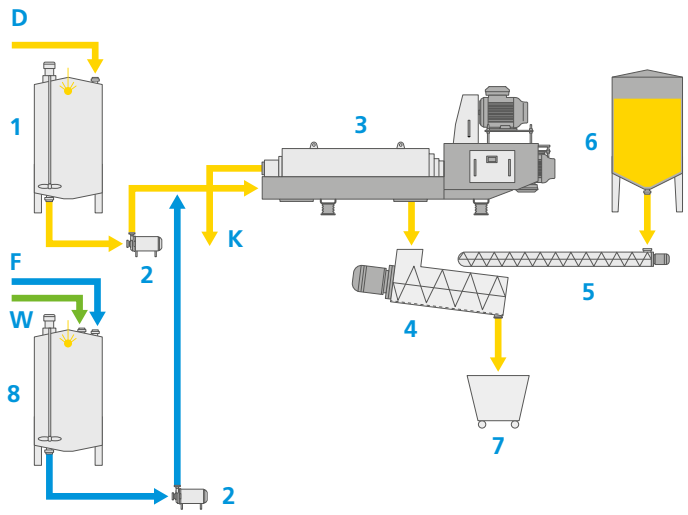
M From wine tank
L To storage tank
W Product for further processing

This process shows the use of the decanter in the production of Vermouth. Activated carbon is mainly used as fining agent to brighten the wine. The decanter processes a feed capacity of 1500 l/h with a solids content of 50 percent by vol. The solids content in the discharge is reduced to 2 – 4 percent by vol..

Clarification of Thin Sludge from Waste Water Treatment Plant

Due to more stringent environmental regulations, industrial waste water may no longer be loaded at will with organic matter. For this reason sediment content should be kept as low as possible. Moreover, fining agent and filtration residue should be recovered in a condition suitable for disposal.

Decanters can be used for dewatering thin sludge. In many cases addition of polymer flocculants is necessary into the clarification section of the machine. Under unfavourable conditions, further treatment (e.g. addition of calcium hydroxide) may be necessary to obtain solids suitable for disposal.



Clarification of thin sludge from waste water treatment plants

- **1** Collection tank
- **2** Pump
- **3** Decanter
- **4** Mixer
- **5** Metering screw
- **6** Lime tank
- **7** Container
- **8** Metering tank
- **F** Flocculant
- **W** Water
- **K** Back to clarification plant
- **D** Thin sludge from waste water treatment plant

Operating Principles and Design Features of Clarifiers

Self-cleaning clarifiers are state-of-the-art in centrifugal technology to satisfy the need for continuous operational processes in wineries. They fulfill all the demands for high quality and optimum yields.

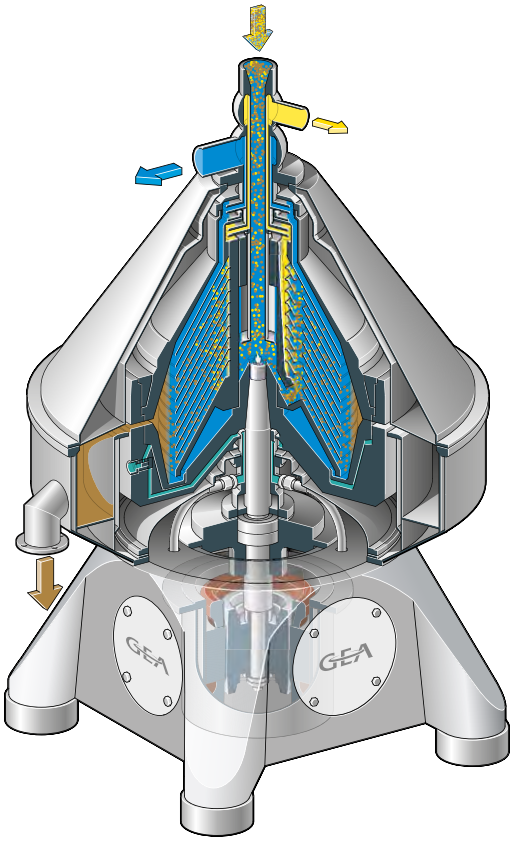
Continuous operation with self-cleaning clarifiers

Clarifiers with self-cleaning bowls are used both by small and large wineries. They operate continuously without interruption. The optimum moment for solids discharge is initiated by the clarifier's photoelectric control system.

These clarifiers are equipped with a disc-type bowl and internally or externally operating sliding piston. The liquid is fast and gently clarified in the disc stack, whereby the solids flow outwards and collect in the sediment holding space. As soon as the optimum moment for ejection is reached, the movable piston is hydraulically opened. The solids are instantly ejected at full bowl speed and the piston returns to the closed position. Clarified liquid is extracted by centripetal pumps foam free and under pressure. All clarifiers are equipped with hydrohermetic (liquid) seal to prevent losses of SO_S, CO_2, and bouquet aroma.

Minimal oxygen pick-up with hydrohermetic design

Oxygen pick-up is prevented without the aid of mechanical seals. Instead a liquid seal is created by a centripetal pump and an additionional stationary disc which submerges into the rotating liquid. The product will keep its aromatic substances and will not come into contact with atmospheric air.



Clarifiers with integrated sound insulation

Besides efficient and economical operation, design measures for the improvement of environmental conditions are also important today. Greater attention has been devoted to the wishes of wine producers for a reduction of noise levels in the design of the latest types of clarifiers. By integrating sound insulation in the clarifier and closed product discharge as well as using new low-noise drive motors, noise levels have been considerably reduced.

The operating noise (sound pressure level) of these clarifiers is less than 78 dB(A). External sound insulation measures are not necessary.

GEA hydro**stop** system for precise bowl ejection

GEA hydro**stop**, a patented hydraulic bowl system, ensures fast and accurate ejection of the solids. The ejection volumes can be adjusted during operation. The product feed is not interrupted and the solids are highly concentrated to prevent product losses and increase the yield.

Optimized for Your Targets: GEA hyvol® and GEA hydry®

Each clarifier can be optimized by adjusting different parameters. The main focus is on the most efficient clarification, a high throughput capacity and the optimal dry substance of the ejected solids The wineries may priorise these targets differently. GEA has designed two separation series to meet these aims:

GEA hy**vol**® stands for high throughput capacities and most efficient clarification.

GEA hy**dry**® for liquids with a high solids content ensures a maximum dry substance of the discharged solids in must and wine clarification.

Both series are CIP-able and provide continuous operation. They are available with belt drive or the space and energy saving integrated direct drive.

Gentle handling of the product by hydrohermetic feed

Both GEA hy**vol**® and GEA hy**dry**® treat the valuable product very gently. The GEA hydrohermetic feed system ensures that the product is always fed into a filled bowl (product in product). This ensures a maximum smooth product handling, minimized shear forces and utmost protection of cells.

*GEA hy**vol**® and GEA hy**dry**® clarifiers have been optimized with regard to customer benefit and fast integration into individual operational processes.*

The capacity factor results from

- Bowl speed
- Disc angle
- Disc number
- Disc diameter

Clarifiers are geared to highest possible effective capacity. Optimization of the capacity factor is limited. Bowl speed depends on the approved stress limits for materials. Disc angle, diameter, and number have to be geared to differing products.

With high solid substance input in the feed, for example must clarification, the effective capacity also depends on the size of the solids space and the possible cleaning frequency.

GEA eco**plus** clarifiers for economic wine production are available across the entire capacity range

The machine series, sold under the name eco**plus** – economy and more – present low-cost alternatives to existing solid-liquid separation systems in wine production.

The GSC clarifier series has been optimized particularly for must and wine clarification. These machines can be used for must clarification within the range of 1000 l/h to 12,000 l/h and for wine clarification from 3000 l/h to 21,000 l/h.

Many of their standard features have made the GEA clarifiers indispensable in wine production today.

Part of the new development concept is the traditional GEA hydro**stop** system. With this system, separated solids are ejected with highest dryness thus ensuring highest yield. The advantage for wine production is maximum wine yield. No other clarifier system can be employed in such a value adding way.

A further highlight is hydrohermetic sealing which prevents product contact with atmospheric air and thus oxygen intake.

Clarifier generation for low capacity range: GSC 25 – particularly for must and wine clarification.

Control Systems for Fully Automatic Operation

Different clarifier control systems are available to achieve uniform low residual moisture content with fluctuating solids concentrations and varying product throughputs. These control systems ensure that solids are ejected at the optimum moment. Clarifying efficiency drops if the sediment holding space of the centrifuge overfills. If it is not optimally filled, ejection losses increase and effective throughput falls because of unnecessarily increased ejection frequency.

Turbidity control of the separator's discharge control

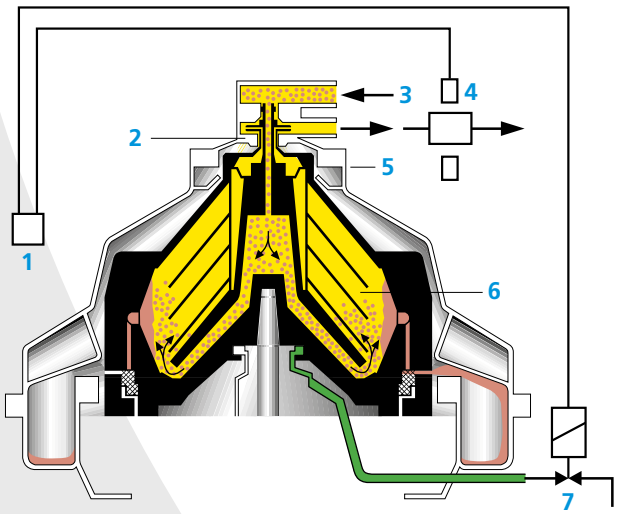
This system monitors the clarified liquid phase. A control device (e.g. light barrier) in the discharge line registers turbidity measured in NTU and initiates the automatic bowl ejection program sequence when a preset turbidity limit is reached or exceeded. This control system is employed for all turbid products like must and wine with a fluctuating solids content or varying product flow. It ensures that the degree of clarification of the discharging liquid remains constant.

The control units used in conjunction with these control systems can be set, depending on the solids content, for

- Partial or total ejection
- Combination of partial and total ejection
- Flush ejection after each total ejection

Automatic operation of self-cleaning clarifiers and optimum usage of throughput capacity are achieved by means of these control systems which have been designed closely based on the know-how of the wine industry.

Automatic control by photo-electric cell in discharge line



1 Proximity switch
2 Flow meter
3 Sensing liquid pump
4 Control unit
5 Discs
6 Inlet of sensing liquid over separating disc
7 Operating water valve

Rotary Brush Strainers and Hydrocyclones in Wineries

Pre-separation of coarse and erosive solids

The increasing mechanisation of wine harvesting and processing also gives rise to problems. The must to be processed contains erosive and coarse solids on a larger scale. These impurities should be removed before clarification to assure continuous processing and avoid erosion and other faults on the clarifier. Depending on the character of the must either rotary brush strainers and/or hydrocyclones can be used.

Rotary brush strainers should be installed upstream for removal of components such as stems, seeds and skins. This reduces the load on the clarifier. Rotary brush strainers are also particularly suitable for screening high-temperature-short-time (HTST) treated mash after pressing. This treatment prevents blockages and deposits in the plate heat exchanger.

Hydrocyclones can be installed when the must contains excessive amounts of sand due to mechanical harvesting of the grapes. The correct arrangement of the installation is important when both devices are used. Rotary brush strainers should always be installed upstream in order to eliminate blockages in the hydrocyclone. The optimum position for both units is between press and must tank. Thus the effects of clarifier ejections and solids fluctuations are eliminated. If local conditions or use of mobile plants prevent installation at this location, then rotary brush strainers and hydrocyclones should be installed directly before the clarifier.

Rotary brush strainers

Rotary brush strainers operate continuously. Air intake is avoided by its closed design. Raw must is fed into the strainer through the inlet. Solids collected on the inside of the cylindrical, perforated strainer insert are pushed down into the conical sediment holding space by rotating scrapers. They can be discharged periodically through the solids outlet. A tangentially arranged flushing connection serves for cleaning the strainer. Suitable rotary brush strainers are available in various sizes for all self-cleaning clarifiers.

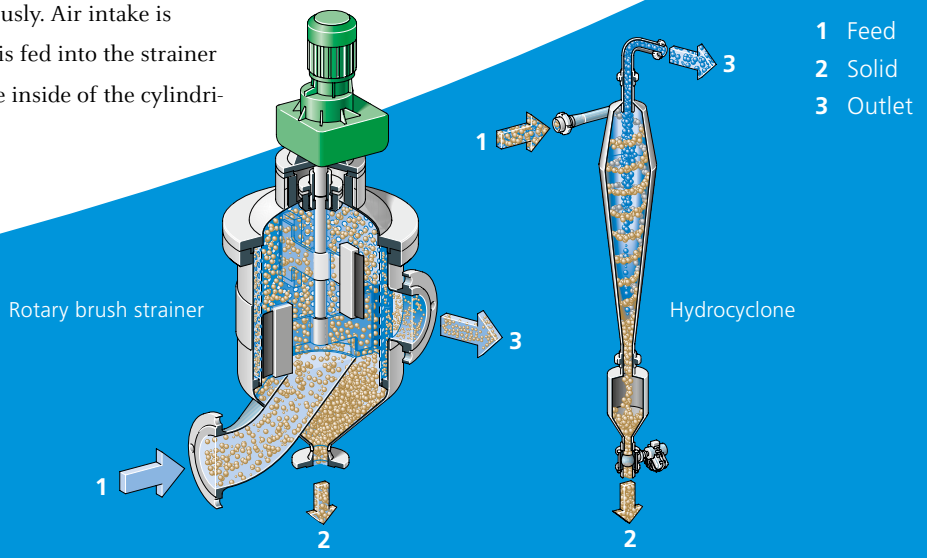
Advantages

- Reduced load on clarifier
- Closed strainer design prevents air intake
- Installation in pressurized system possible

Hydrocyclones

Hydrocyclones are centrifugal separators which find application, among other things, for separation and classification of solids suspended in liquids. In the wine industry they are used for de-sanding the must in order to protect the valuable clarifier bowl from wear as well as for tartrate separation. Because of their closed design (sealing of lower part by so-called grit pot), O2 intake and must losses are avoided. Sand-containing must enters the hydrocyclone at the required pressure “p” through the inlet.

Sand particles pass through the apex nozzle into the grit pot. The de-sanded must leaves the hydrocyclone through the outlet. Sand particles are discharged discontinuously through the valve. The opening process can be carried out manually or automatically with the aid of a timer.



Operating Principles and Design Features of Decanters

Decanters are solids-oriented centrifuges with a solid-wall bowl. A scroll conveys solids to the outlet ports, where they are continuously discharged.

Decanters for wineries in various designs

- Decanters with discharge of clarified liquid under pressure. With this design clarified liquid is discharged foam free and under pressure by a paring disc (centripetal pump)
- Decanters with gravity discharge of clarified liquid. Clarified liquid is discharged into a balance tank or other processing units
- Decanters in gas-tight design. These decanters are used when oxidation of the incoming product must be avoided. Connections for inert gas blanketing are provided with these types

Decanters have been developed for high clarifying performance and the highest possible degree of solids drying.

Essential conditions for this include, among others, high bowl speed and an enormously high scroll torque in conjunction with a control system to synchronise the differential speed to the solids load.

The processed material enters the decanter through the feed tube and is conveyed by the distributor into the separating chamber. It is accelerated here to the operating speed. Solid particles quickly sediment on the bowl wall due to centrifugal force.

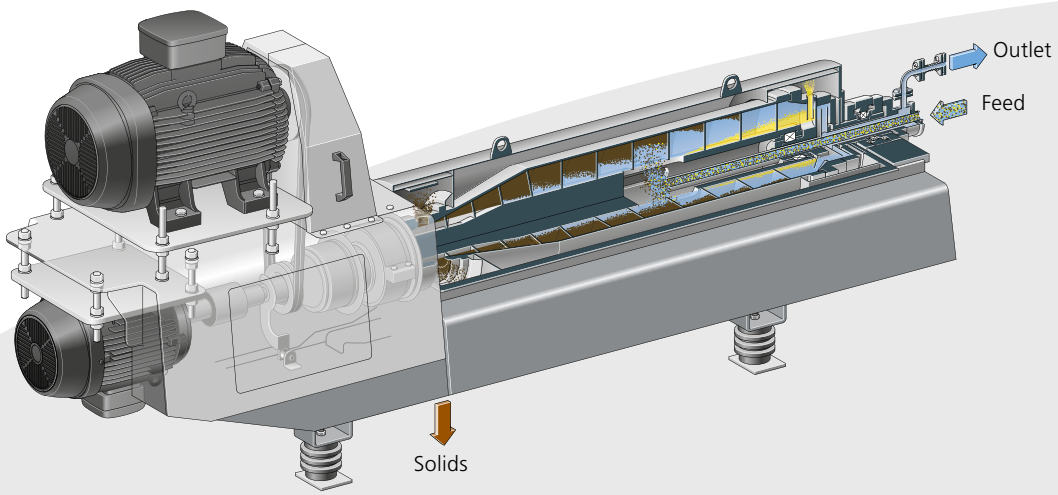
The bowl has a cylindrical-conical shape. In the cylindrical section, this shape allows effective clarification of the liquid, and the solids are effectively dried in the conical section.

The scroll turns slightly faster than the bowl shell and conveys separated solids continuously to the narrow end of the bowl. Due to the conical shape of this part of the bowl, the solids are lifted out of the liquid.

When passing the "drying zone", which the liquid does not enter, the adhering liquid is removed under the action of centrifugal force.

The solids are then ejected through openings at the bowl's end into the collecting vessel of the housing. The liquid flows between the scroll flights to the opposite end of the bowl. Lighter particles remaining in the liquid are separated by centrifugal force when passing through the clarifying zone and are conveyed by the scroll together with the solids seized in the inlet zone to the outlet. Clarified liquid leaves the separation chamber over adjustable regulating plates or is extracted under pressure by scrapers.

Depending on the decanter type, the drive is provided either by 3-phase motors for starting under load or standard motors with hydrostatic clutches. 3-phase motors with frequency converters can be employed optionally. This allows for reduction of starting current and current peaks during starting. An adjustable, hydrostatic clutch reduces the starting current. Power is transmitted by belts.

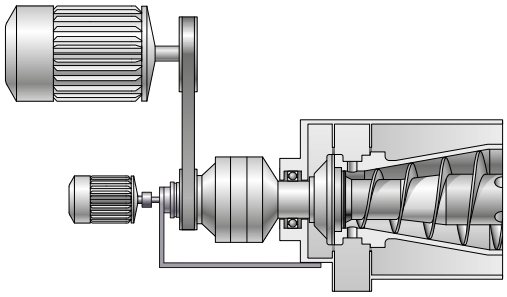


GEA **summation**drive

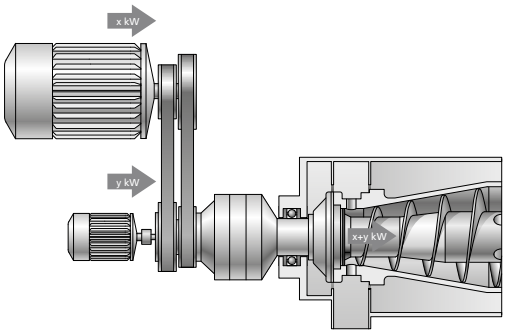
The GEA **summation**drive always provides the full torque across the entire regulation range. It supplies only the power which is actually required, because the secondary motor is operated purely as a motor, and there are no braking effects. Accordingly, the drive does not require any backdrive and provides savings in terms of unnecessary conversion losses as well as belt drives, shaft loads and construction space. In the version used for higher differential speeds, the drive combines the output of the primary and secondary motor (summation) and thus minimizes energy consumption.

Conversion to the higher differential speed range is possible without having to replace the gear. In both drive versions, the differential speed is provided over large ranges without any interruptions.

The drive is equipped with a multiple-stage oil-lubricated planetary gear with two input shafts. Three planetary gears of different sizes for each decanter size enable the decanters to be simply adjusted to changed process conditions and requirements applicable to the torque.



summationdrive with torque arm
(for diff. speed of 1 – 25 rpm)



summationdrive with two pulleys
(for diff. speed of > 25 rpm)

Decanters synonymous with quality, performance and economy

- Highest possible dewatering with maximum separating efficiency
- High operating safety, reliability and low wear
- Rapid adjustment of machine parameters to changing products and processes
- Small space requirement
- Low labour costs and operating expenses
- Automatic and continuous operation
- Simple operation and easy maintenance
- High-precision manufacturing ensures easy onsite replacement of all parts
- Easy access
- Simple assembly/disassembly
- Fast delivery of spare parts and 24-hour repair service

engineering for
a better world

We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

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