



# BATCH FORMULA® Test Mixer

Versatile, small-scale mixing and  
blending for multiple applications

# A Uniform Mix

From food, dairy and beverage to personal care, mixing is one of the most demanding unit operations in today's process industries.

Choosing the right mixing technology is crucial — as the mixing process not only has an impact on the processing — but also on the batch cycle times and the total cost of ownership. So, whether it's dissolution, emulsification and/or dispersion of ingredients into a liquid solution/medium, the ability to mix powders and liquids homogeneously is a critical aspect of product quality, safety and shelf life.

The repeatability of every step in the production process is paramount; operating conditions need to be exactly the same during every batch to deliver reliable product quality and ensure consumer confidence. Our technology will make you rethink the traditional way of mixing.

## Optimize Production with the BATCH FORMULA® Test Mixer

Providing an opportunity to optimize specific production processes on a small scale, the BATCH FORMULA® Test Mixer is a cost-efficient option to trial and develop a formulation prior to investing in a standard, full-scale BATCH FORMULA® Mixer.

As such, the BATCH FORMULA® Test Mixer can also help to reduce valuable time-to-market. Small-scale tests can be done to clarify important process parameters, including when to add ingredients, temperature profile and run times, which expedites scale-up and process development.

For some customers, the BATCH FORMULA® Test Mixer may simply be a stepping stone to full-scale manufacturing; for others, it's the ideal, cost-efficient, small-scale production solution.



### Flexible Operation, Reduced Downtime

The BATCH FORMULA® Test Mixer enables customers to work with a variety of products using the same equipment, thereby optimizing plant capacity. Reduced downtimes combined with efficient mixing shortens the time between batches.

### Faster Processing, Higher Quality, Longer Shelf Life

GEA's BATCH FORMULA® Test Mixer has been designed to meet the strictest hygiene requirements in the food, dairy, beverage and personal care industries. This time-efficient high shear mixer reduces product processing times, which not only increases product quality by limiting exposure to air, it's also cost-effective in terms of labor.

High product stability is achieved when particles stay dispersed in the solution without separating. GEA understands that products suffer from flocculation and sedimentation during mixing and has designed the BATCH FORMULA® Test Mixer to avoid such problems. This results in an extended shelf life and increased end-product quality.

### High Yield

The product outlet is located at the lowest point of the mixer vessel and, at the end of each batch, ensures 100% drainage to reduce wastage. The high product recovery of potentially expensive ingredients also reduces operating expenses by decreasing the cleaning time.

### Proven Design

To ensure both product quality and consistency, all GEA technology is designed from the outset to contribute to rapid plant development, bring products to market quickly and create new marketing opportunities for you.



# The Technology

Offering both batch and continuous processing solutions, from pilot plant skids to full-scale processing plants, as individual modules or as completely integrated systems.

We have the experience, understanding, process knowledge and group know-how to incorporate and implement these best of breed technologies into world-class plants for our customers.

Powdered products require efficient wetting to prevent the formation of fish eyes (poorly dispersed powder). Lump formation occurs when a large amount of powder is suddenly introduced into the liquid, preventing sufficient wetting.

Some powders can be difficult to mix because of high levels of particle attraction, or cohesiveness, and subsequently require longer processing times. To overcome this challenge, the BATCH FORMULA® Test Mixer has been designed to solubilize most powders very quickly.

Many suspensions — the dispersion of high density particles in a low density solution — are unstable because of electrostatic forces between the particles and the density differential. To achieve a stable suspension, it's important to understand the properties of the particles to achieve efficient introduction and blending.

The BATCH FORMULA® Test Mixer is fully clean-in-place (CIP) and, as such, with no need for a separate CIP system, is environmentally friendly and has a smaller footprint.



### Key Benefits of the BATCH FORMULA® Test Mixer

- Energy efficient mixing provides an effective high shear action to deliver carefully controlled product properties.
- Integrated process control ensures product integrity by monitoring vital parameters to guarantee critical quality attributes are achieved.
- Rapid part changeover provides flexibility and the ability to produce a wide range of product types.
- The GEA Vacuum System enables liquid/powder introduction below the blend surface, which reduces the processing time and limits issues with air incorporation and foaming.
- The efficient wetting of powders and liquids beneath the liquid surface limits equipment clogging, increasing both production capacity and operational efficiency.
- The top-mounted agitator with scrapers prevents discoloration and crystallization inside the vessel.
- High yields and 100% product recovery.



# Applications

The BATCH FORMULA® Test Mixer is suitable for a wide range of product applications and can be adjusted to handle specific recipe requirements.

## Low Viscosity Products

Low viscosity products are relatively easy to mix; however, owing to the low viscosity, sedimentation can occur. The high shear mixer can process products by introducing ingredients at different steps, which can improve product stability by controlling both ingredient introduction and process time.

Examples include the following:

### Protein based drinks

Introducing the powder into the solution below the liquid surface at a high speed eases the dissolution and creates a homogeneous product with no protein aggregates.

### Chocolate drinks

The introduction of cocoa powder into milk is often challenging because of its low wettability. However, suspension is not a problem when powder is introduced below the liquid surface.

## Recombined milk

Milk powder is much easier to handle than raw milk; which can be dissolved by the BATCH FORMULA® Test Mixer to obtain properties resembling fresh milk.

## Infant nutrition

High quality, hygienic mixtures can be produced in the BATCH FORMULA® Test Mixer.

## Sweetened condensed milk

Crystallization derived from high sugar concentrations can be avoided by effective dissolution and subsequent dispersion in the BATCH FORMULA® Test Mixer.

## Ice cream pre-mixes

Using a pre-mix avoids certain dissolution issues, such as with sugar, enabling powders to be introduced at a much higher rate.

## Yoghurt-based drinks

High shear technology can enhance the efficiency of powder dissolution and reduce the amount of powder needed, helping to stabilize yoghurt-based drinks.



### High Viscosity Products

Products containing a large amount of total solids can be difficult to process because of wetting and dissolution issues. The BATCH FORMULA® Test Mixer is able to mix high solid concentration products by using high shear technology to wet powders below the liquid surface. Examples include the following:

#### Mayonnaise

The water in mayonnaise is stabilized by increasing its viscosity with powder. Emulsifiers are also used to obtain a stable emulsion and the high shear mixing technology facilitates the dispersion of oil droplets.



#### Cream cheese

When cream cheese is produced, the fresh cream is separated and mixed with defined ingredients to achieve the right taste and texture. The BATCH FORMULA® Test Mixer can optimize ingredient dispersion to achieve the required consistency.



#### Ketchup

Despite the very high ratios of sugar and spices compared with the available liquid (tomato juice), it is still possible to obtain highly stable, high viscosity ketchup products using the high shear mixer.



#### BBQ sauce

Sugar and minor ingredients are added at a high shear rate to form the high viscosity sauce in which vegetables and fruits are dispersed at low shear rates. The BATCH FORMULA® Test Mixer offers different processing options for fragile ingredients.



#### Personal care products

Home and personal care products such as creams, lotions, soaps, face masks and mascaras contain high concentrations of reactive chemicals that must be blended in the correct order to avoid unwanted reactions. The funnels attached to the BATCH FORMULA® Test Mixer enable clear separation and stepwise addition, which helps to promote the formation of molecules with the right structure and functional properties.



## We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is a global technology company with multi-billion euro sales operations in more than 50 countries. Founded in 1881 the company is one of the largest providers of innovative equipment and process technology. GEA is listed in the STOXX® Europe 600 Index. In addition, the company is included in selected MSCI Global Sustainability Indexes.

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