

## CHY-MAX® M

### Product Information

Version: 2 PI GLOB EN 06-20-2016

#### Description

CHY-MAX® M is a pure chymosin produced by submerged fermentation on a vegetable substrate with *Aspergillus niger* var. *awamori* kept under contained conditions and not present in the final product. The product contains a milk-clotting enzyme which is highly specific for kappa-casein, resulting in very good curd formation. The general activity also has a significant influence on the flavor and texture development of cheeses. The active milk-coagulating enzyme is chymosin (EC 3.4.23.4).

|              |           |               |                                                             |
|--------------|-----------|---------------|-------------------------------------------------------------|
| Material No: | 127223    | Storage temp: | 0 - 8 °C / 32 - 46 °F                                       |
| Size         | 5 US GAL  | Conditions:   | Protect from light . Keep closed in the original container. |
| Type         | Container |               |                                                             |

#### Shelf life

12 months from quality release when stored according to the recommended storage conditions. The shelf life is limited to 3 months after opening, provided the product is maintained according to the recommended storage conditions.

#### Transport condition

The product should be transported between -5 and 20 °C / 23 and 68 °F with a maximum transit time of 7 days outside this interval. Prolonged exposure to heat above this temperature may influence the shelf life and activity of the product.

#### Patent information\*

Patented

#### Application

CHY-MAX® M can be used for producing any type of cheese; hard, semi-hard, soft, mold-ripened, low-fat and ingredient cheeses.

#### Dosage

20-50 IMCU/ L milk

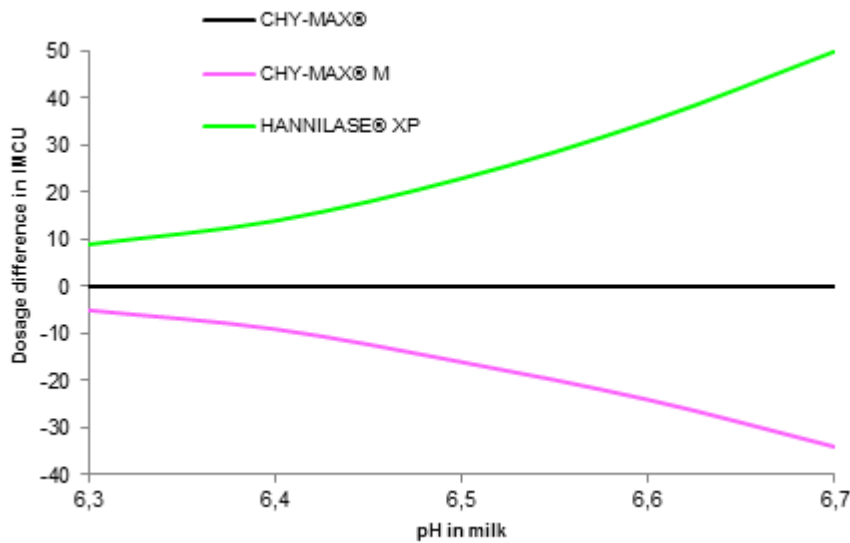
The correct dosage of coagulants depends on the following factors: cheese type, temperature and pH of the cheese milk, characteristics of cultures and dosage of CaCl<sub>2</sub> and NaCl. Factors may vary according to country, dairy and day. Therefore, exact dosage should be optimized to local conditions. CHY-MAX® M can be added in lower concentrations (e.g. IMCU/100 L) than other coagulants. Dosage requirements depend on the pH of milk at the addition of coagulant.

#### Suggested dosage difference

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**Directions for use**

Heat the milk to the desired renneting temperature. It is recommended to dilute 1 part of coagulant in 5-15 parts of water prior to use. Dilution water must have a pH <6.4 and be free of chlorine. If pH and chlorine are not under control, we recommend to mix 80% of cold water with 20% of cold milk, and use this solution for dilution. The diluted coagulant should be added immediately to the milk while stirring for 2-3 minutes to distribute the coagulant properly in the cheesemilk.

**Composition**

Water, Sodium chloride, Sodium benzoate E211 (<1%), Chymosin

**Specification**

**Properties**

Average activity: 1000 IMCU/ml      Guaranteed activity: >= 950,0 IMCUML  
 Guaranteed activity is the minimum activity at best-before date.

**Content**

Enzyme type: Fermentation produced chymosin      Chymosin: 100 %

**Physical Properties**

Color: Colorless to amber      Form: Liquid  
 Solubility: Water soluble      Odor: Characteristic  
 pH: 5.50 - 6.00      Density: 1.07 - 1.14

The product may exhibit batch-to-batch color variations. This has no influence on the activity.

**Formulation**

Sodium chloride (w/v): > 10,0 %      Sodium benzoate (w/v): <1,0 %

**Microbiological quality**

|                         |                |                                   |                |
|-------------------------|----------------|-----------------------------------|----------------|
| Total count:            | < 100 cfu/ml   | Aerobic plate count:              | < 100 cfu/ml   |
| Yeast and mould:        | < 10 cfu/ml    | Coliform bacteria:                | < 10 cfu/ml    |
| Escherichia coli:       | Absent in 1ml  | Salmonella spp.:                  | Absent in 25ml |
| Listeria monocytogenes: | Absent in 25ml | Coagulase-positive staphylococci: | Absent in 10ml |

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**Conformity**

Amylase: Below detection  
 Amylase and Lipase are tested in 100 IMCU

Lipase: Below detection

**Comments**

Methods are available on request.

Our fermentation produced enzymes are tested for the relevant mycotoxins and metabolites according to JECFA's General Specifications for Enzymes.

This product complies with the recommended purity specifications for food-grade enzymes given by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Food Chemical Codex (FCC) with heavy metal specifications for Lead ( $\leq 5$  ppm), Cadmium ( $\leq 0,5$  ppm), Mercury ( $\leq 0,5$  ppm) and Arsenic ( $\leq 3$  ppm).

**Certificate of Analysis**

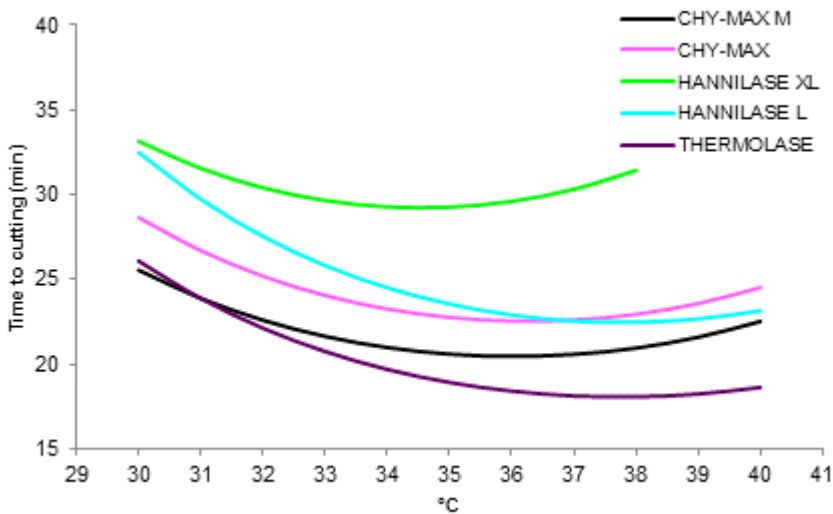
A Certificate of Analysis (CoA) will normally accompany the goods.

**Technical Data**

**Temperature**

The relative activity of different coagulants depends on the temperature. For this product, the temperature optimum is approximately 36-40°C / 97-104°F.

The following graph demonstrates the influence of temperature on coagulant activity in milk (3700 IMCU/ 100L, 3.1% milk fat, 3.5% protein, pH 6.5)



**pH**

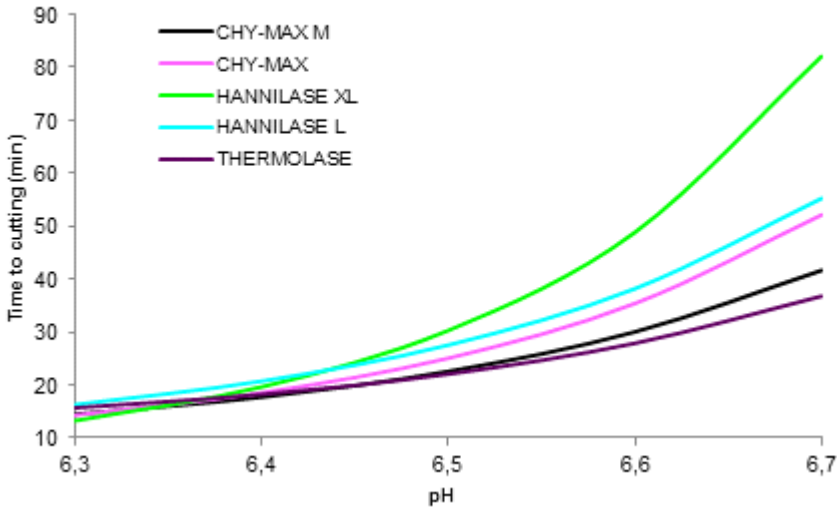
The activity of coagulants is pH dependent; the lower the pH, the higher the activity.

The following graph demonstrates the influence of pH on coagulant activity in milk (3700 IMCU/ 100L, 3.1% milk fat, 3.5% protein, 32°C)

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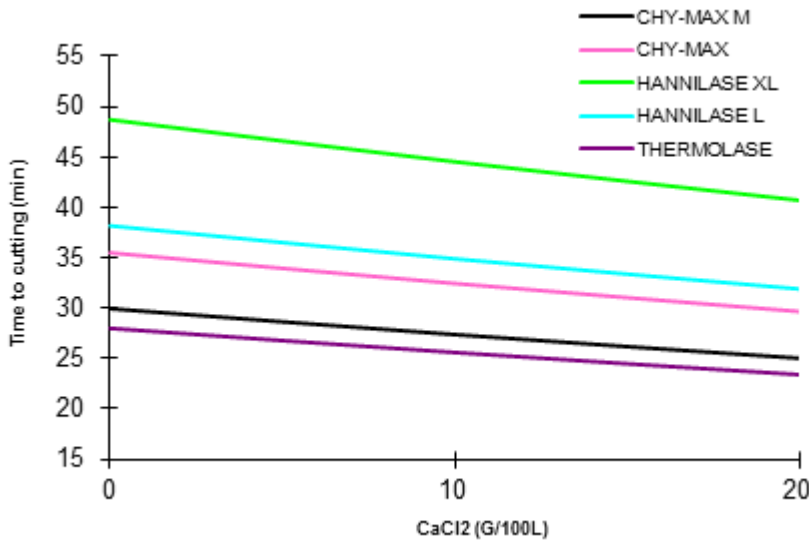
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**Calcium**

The addition of calcium chloride to milk increases the activity of coagulants due to a decrease in pH and also has an effect on aggregation. Excessive use of calcium chloride may induce bitterness in the cheese.

The following graph demonstrates the influence of calcium chloride on coagulant activity in milk (3700 IMCU/ 100L, 3.1% milk fat, 3.5% protein, 32°C, pH 6.6)



**Stability**

Residual milk clotting activity in whey following pasteurization for 15 seconds at pH > 6.0 and a temperature of 72°C/ 162°F:

|                  |      |               |       |                 |      |
|------------------|------|---------------|-------|-----------------|------|
| NATUREN® Stabo   | > 5% | HANNILASE® L  | > 30% | CHY-MAX®        | < 1% |
| NATUREN® Stamix  | > 2% | HANNILASE® XP | < 1%  | CHY-MAX® M      | < 1% |
| NATUREN® Premium | < 2% | HANNILASE® XL | < 2%  | CHY-MAX® M Soft | < 1% |
| NATUREN® Extra   | < 2% | THERMOLASE®   | < 1%  |                 |      |

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### Technical support

Chr. Hansen's Application and Product Development Laboratories and personnel are available if you need further information.

## Dietary Information

|             |                              |
|-------------|------------------------------|
| Kosher:     | Kosher Pareve Excl. Passover |
| Halal:      | Certified                    |
| Vegetarian: | Yes                          |

## Handling precautions

For detailed handling information, please refer to the appropriate Safety Data Sheet. Enzymes may cause irritation upon inhalation or skin contact among sensitive individuals. The use of personal protection equipments such as gloves, goggles and respiratory equipment can prevent sensitisation. For additional guidelines refer to 'Guide to the safe handling of microbial enzymes preparations' published by the Association of Manufacturers and Formulators of Enzyme Products (AMFEP) and 'Working Safely With Enzymes' by the Enzyme Technical Association (ETA).

According to EU legislation, disposal of packaging material of this product should be treated as hazardous waste. Alternatively, or for non EU countries, packaging may be disposed of as normal waste by rinsing with plenty of water to ensure no enzyme residues are present.

## Legislation

This product complies with JECFA- (FAO/WHO) and FCC-recommended specifications for food-grade enzymes. The application of enzymes in food processing is governed by general food laws and by Reg. (EC) No 1332/2008. However, the approval system provided by Reg. 1332/2008 is not yet fully operational. Chr. Hansen A/S will ensure EU approval in due time. Meanwhile, please check for local/national rules or regulations as national requirements may apply.

The product is intended for use in food.

## Labeling

Enzymes, as processing aids, generally do not need to be labelled on the final product. However local legislation and standards of identity for the final product should always be consulted.

## Trademarks

Product names, names of concepts, logos, brands and other trademarks referred to in this document, whether or not appearing in large print, bold or with the ® or TM symbol are the property of Chr. Hansen A/S or used under license. Trademarks appearing in this document may not be registered in your country, even if they are marked with an ®.

### \*Patent No.

EP 1334182, AR 031620, US 7270989, US 7776581, US 6103490, US 6171817, CA 1341532. Other patents are applied for.

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**GMO Information**

In accordance with the legislation in the European Union\* CHY-MAX® M does not contain GMOs and does not contain GM labeled raw materials\*\*. In accordance with European legislation on labeling of final food products\*\* we can inform that the use of CHY-MAX® M does not trigger a GM labeling of the final food product. Chr. Hansen's position on GMO can be found on: [www.chr-hansen.com/About us/Policies and positions/Quality and product safety](http://www.chr-hansen.com/About us/Policies and positions/Quality and product safety).

\* Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms with later amendments, and repealing Council Directive 90/220/EEC.

\*\* Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed with later amendments.

Regulation (EC) No 1830/2003 of the European Parliament and of the Council of 22 September 2003 concerning the traceability and labeling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms amending Directive 2001/18/EC, and with later amendments.

**Allergen Information**

| List of common allergens in accordance with the US Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA) and EU Regulation 1169/2011/EC with later amendments | Present as an ingredient in the product |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Cereals containing gluten* and products thereof                                                                                                                             | No                                      |
| Crustaceans and products thereof                                                                                                                                            | No                                      |
| Eggs and products thereof                                                                                                                                                   | No                                      |
| Fish and products thereof                                                                                                                                                   | No                                      |
| Peanuts and products thereof                                                                                                                                                | No                                      |
| Soybeans and products thereof                                                                                                                                               | No                                      |
| Milk and products thereof (including lactose)                                                                                                                               | No                                      |
| Nuts* and products thereof                                                                                                                                                  | No                                      |
| List of allergens in accordance with EU Regulation 1169/2011/EC only                                                                                                        |                                         |
| Celery and products thereof                                                                                                                                                 | No                                      |
| Mustard and products thereof                                                                                                                                                | No                                      |
| Sesame seeds and products thereof                                                                                                                                           | No                                      |
| Lupine and products thereof                                                                                                                                                 | No                                      |
| Mollusks and products thereof                                                                                                                                               | No                                      |
| Sulphur dioxide and sulphites at concentrations of more than 10 mg/kg or 10 mg/litre expressed as SO <sub>2</sub>                                                           | No                                      |

\* Please consult the EU Regulation 1169/2011 Annex II for a legal definition of common allergens, see European Union law at: [www.eur-lex.europa.eu](http://www.eur-lex.europa.eu)