

TYLOPUR[®]

Food Grades



The Food Ingredients to Stabilize Your Food

ShinEtsu



Soft crumb and high volume
in gluten-free bread



Best bite in
plant-based products

Benefits of TYLOPUR®



Optimization of costs
in meat products



Stabilization of
reformed products

TYLOPUR® is Beneficial for Many Applications

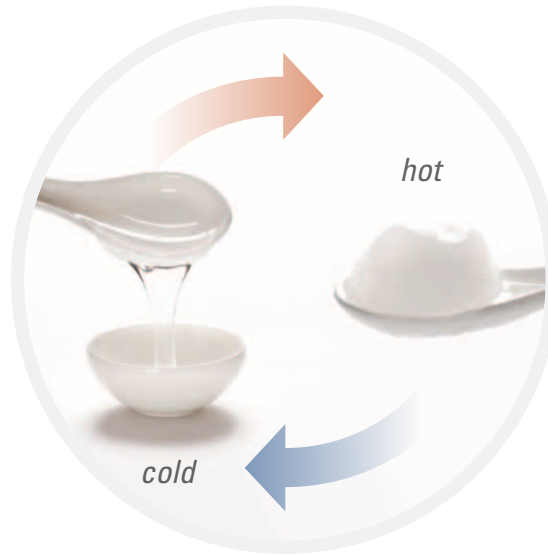
Applications	Benefits of TYLOPUR®	Recommended grades	Dosage level [%]
Plant-based products 	<ul style="list-style-type: none">  Creates strong bite  Creates juicy texture  Mimics meat-like texture 	MCE-100TS MCE-4000	0.5 – 2.0
Gluten-free products 	<ul style="list-style-type: none">  Increases volume  Creates soft texture  Mimics properties of gluten 	NE-15000 NE-4000 SFE-4000	0.6 – 1.5
Cost-effective meat 	<ul style="list-style-type: none">  Creates strong bite  Imitates meat structure during warm consumption  Lowers overall costs 	MCE-100TS	0.7 – 2.0
Fillings – savory and sweet 	<ul style="list-style-type: none">  Retains product integrity at high temperatures  Prevents bursting and leakage 	MCE-4000 NE-15000	0.3 – 0.6
Reformed products <i>(potato, meat, cheese, fish)</i> 	<ul style="list-style-type: none">  Stabilizes reformed products  Prevents leaking and bursting  Reduces oil uptake 	MCE-4000 MCE-100TS	0.2 – 0.5
Non-dairy whipped cream 	<ul style="list-style-type: none">  Improves overrun  Stabilizes non-dairy whipped cream 	SFE-400 NE-4000	0.1 – 0.6

For further applications please contact us – we look forward to assisting you.






Unique Stabilizer

TYLOPUR® food grades have unique properties for increasing viscosity during heating that stabilize your food system where other typical hydrocolloids fail. Our products ensure that structured products have a






good shape and texture throughout the steps of processing, frying, cooking, freezing, and making the final preparations for serving.



Benefits

-  Maintain product shape during heating
-  Provide reversible thermal gelation
-  Prevent hard and gummy textures
-  Provide fat-like mouthfeel
-  Control viscosity at low and high temperature

General Properties

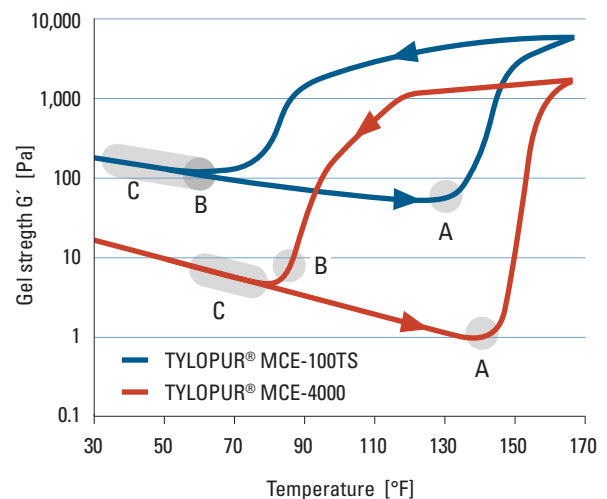
-  Plant-based
-  Thickening
-  Film-forming
-  Stable in various pHs
-  Derived from non-GMO wood pulp

Thermal Gelation

TYLOPUR® has the unique property of increasing viscosity during heating. When food containing TYLOPUR® is heated, a gel starts to form above a given temperature.






The figure shows the thermal gelation of 2 % TYLOPUR® MCE-4000 and TYLOPUR® MCE-100TS solutions. If the solution is heated, the viscous solution starts to gel (A) and the viscosity increases. During cooling, the viscosity drops to the original value (B).

It is necessary to cool the precooked product containing TYLOPUR® below the hydration temperature (C) to guarantee optimal functionality.



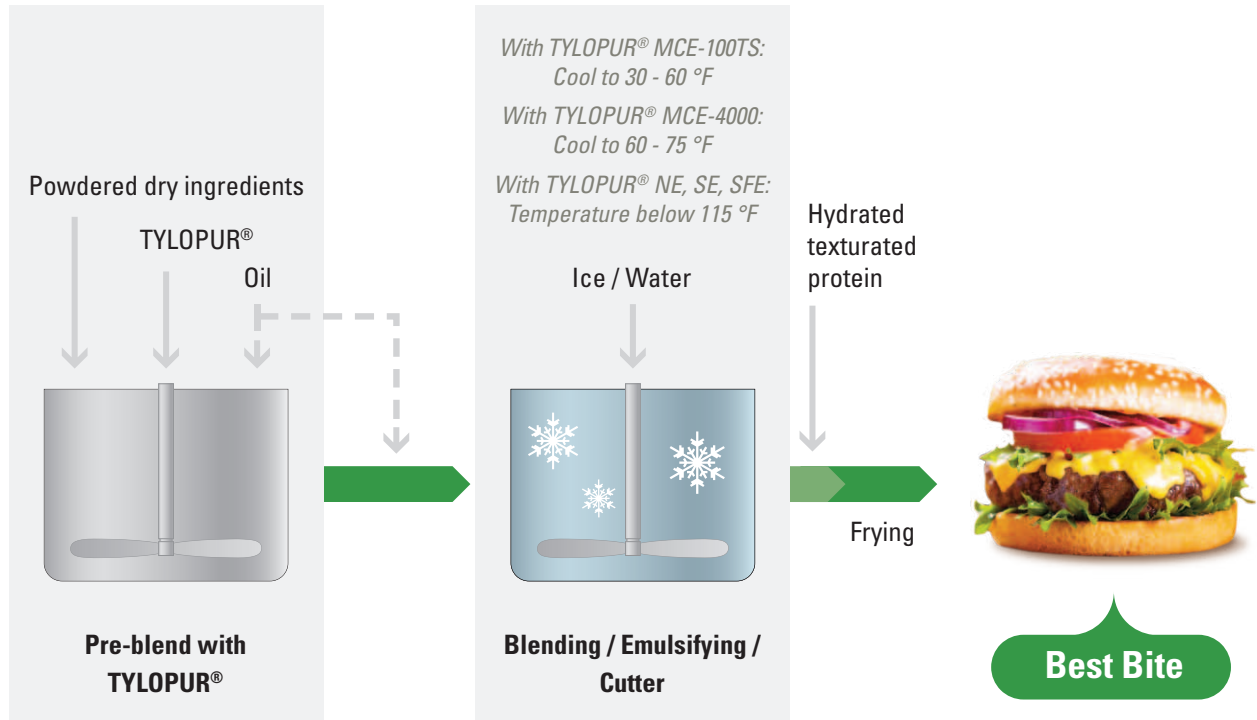
Grades of TYLOPUR®

Viscosity 2 % aqueous solution [mPa·s]	MCE-100TS	MCE	SFE	SE	NE
6				SE-6	
400			SFE-400		
4000		MCE-4000	SFE-4000		NE-4000
15000					NE-15000
110000	MCE-100TS				

	MCE-100TS	MCE	SFE	SE	NE
Pictures of hot gel of a 2 % aqueous solution					
Labeling	Methylcellulose, E461 USA: Modified Cellulose		Hydroxypropyl Methylcellulose, E464 USA: Modified Cellulose		
Methoxyl content [%]	27.5 – 31.5	27.5 – 31.5	27 – 30	28 – 30	19 – 24
Hydroxypropoxyl content [%]	0	0	4 – 7.5	7 – 12	4 – 12
Gelation temperature* (A)	130 °F	140 °F	160 °F	150 °F	165 °F
Disappearance of gel after heating* (B)	60 °F	85 °F	120 °F	130 °F	150 °F
Optimal hydration temperature	< 40 °F	< 70 °F	115 °F		
Hydration temperature* (C)	30 – 60 °F	60 – 75 °F	115 °F		
Properties	Very firm gel, cooling required	Firm gel, good shape and water retention	Semi-firm gel, foam stabilization	Semi-firm gel, very good film forming property	Soft gel, high sugar tolerance
* Dosage and type of food affect gelation temperature, disappearance of gel, and hydration temperature					

Right Preparation for the Best Bite

TYLOPUR® requires the right preparation and cooling temperature to achieve its full potential. For example, an optimal bite in plant-based burgers is achieved when a pre-blended TYLOPUR® MCE-100TS is emulsified at high shear at temperatures below 40 °F.



Right Mixing



Blend TYLOPUR® with other dry ingredients or oil before adding water.

Bite is improved by emulsifying and by applying vacuum thereby.

Right Cooling



TYLOPUR® MCE-100TS: Decent bite if cooled below 60 °F, best bite if cooled below 40 °F during preparation.

Use TYLOPUR® MCE-4000 if preparation temperature is above 60 °F.

If TYLOPUR® NE, SE or SFE are used, no cooling is required

Preparation temperature	40 °F	50 °F	60 °F	40 °F	40 or 60 °F	40 °F
Grade	TYLOPUR® MCE-100TS	TYLOPUR® MCE-100TS	TYLOPUR® MCE-100TS	TYLOPUR® MCE-100TS	TYLOPUR® MCE-4000	No TYLOPUR®
Emulsion made	Yes	Yes	Yes	No	Yes	Yes
Hot bite of burgers	++++ Very good	+++ Good	▲ Medium	++ Good	+ Good	- Poor




Plant-based burgers were prepared with the ingredients mentioned on page 8. Temperatures, grades and the process were varied as mentioned in the table.

Example Recipes





Plant-Based Burger



-  Hydrate textured wheat with double the amount of water for 30 minutes.
-  Mix rest of ingredients and emulsify with ice cold water in vacuum cutter below 40 °F for 6 min.
-  Add hydrated textured wheat, form and fry.





Ingredients	Dosage [%]
Water	64.8
Wheat texturates	14.5
Canola oil	10
Pea protein	5.5
TYLOPUR® MCE-100TS	1.8
Steak flavor (Exter)	1
Salt	0.9
Potato starch	0.7
Umami flavor	0.5
Color	0.3
<i>Total</i>	<i>100</i>

Benefits

-  Strong bite
-  Meat-like texture



Plant-Based Sausage



-  Blend all dry ingredients except for the egg white powder with oil.
-  Add onions and water (if possible < 60 °F) and emulsify all ingredients below 70 °F.
-  Add egg white powder and emulsify well.
-  Fill the casings with sausage mix. Heat them to an inner temperature above 160 °F in simmering water.





Ingredients	Dosage [%]
Water	56
Canola oil	18
Soy protein isolate	8
Egg white powder	5
Aroma vegetarian sausage	4.5
Onions	4
Carageenan	2
TYLOPUR® MCE-4000	1.5
Salt	1
<i>Total</i>	<i>100</i>

Benefits

-  Strong meat-like bite
-  Perfect texture



Gluten-Free Bread



-  Weigh all dry ingredients and blend well.
-  Add liquid ingredients (85 °F) and knead for 6 min in a dough hook.
-  Proof 350 g in baking tins for 75 min (100 °F, 86 % humidity).
-  Preheat oven to 480 °F. Place bread in preheated oven. Bake at 390 °F, rotating air with steam for 1 min, then with air for 35 min. Leave the bread in the baking tin for 2 min after baking.









Ingredients	Dosage [%]
Water	29.5
Sourdough	29
Cornstarch	25
Canola oil	5
Sugar	3
Psyllium	2
Yeast (fresh)	2
Pea protein	1.7
Salt	1.4
TYLOPUR® NE-15000	1.2
Guar gum	0.2
<i>Total</i>	<i>100</i>

Benefits

-  Good volume
-  Soft crumb



Cost-Effective Meat



-  **Matrix:** Mix dry ingredients of matrix with oil.
-  Blend and emulsify together with ice cold (30 – 40 °F) water.
-  **Cost-effective meat:** Place ground meat in a cutter and blend for a few rounds.
-  Add seasoning ingredients.
-  Add ice and blend well until a temperature of 35 – 40 °F is reached.
-  Add oil and blend well until a temperature of 50 – 55 °F is reached.
-  Add matrix and blend briefly.
-  Fill the casings with the sausage mix and proceed with smoking, drying, and blanching.






Ingredients matrix	[%]	Ingredients sausage	[%]
Water	72.7	Matrix	30
Oil	18.2	Pork meat	49
MCE-100TS	4.6	Oil	10.5
Potato starch	2.2	Ice	10.5
Salt	0.8	<i>Total</i>	<i>100</i>
Sodium gluconate	0.7		
MCC	0.5		
Sodium carbonate	0.4	Seasoning	33.2
<i>Total</i>	<i>100</i>	<i>[g] per kg mix</i>	

Benefits

-  Excellent bite
-  Lower costs



Mozzarella Sticks



-  Mix starch and **TYLOPUR® MCE-4000**.
-  Add water (approx. 60 °F) and mix well. Hydrate mixture for 15 min.
-  Add cheese and blend the mixture until texture feels smooth and plastic.
-  Shape mixture into sticks. Batter (30% wheat flour, 70% water) and bread sticks two times. Pre-fry for 40 s at 340 – 355 °F. Freeze sticks.
-  Fry frozen sticks for 4.5 min at 340 – 355 °F.









Ingredients	Dosage [%]
Shredded mozzarella	90.6
Water	6
Cornstarch	3
TYLOPUR® MCE-4000	0.4
<i>Total</i>	<i>100</i>

Benefits

-  Excellent stabilization
-  No bursting of the fried product



Potato Croquettes



-  Cook potatoes in salted water for about 15 min.
-  Mix dry ingredients.
-  Cool potatoes down to room temperature.
-  Add dry blend and mash potatoes.
-  Add water and mix well.
-  Form croquettes by extruding and breading.
-  Pre-fry 40 s at 355 °F, afterwards freeze croquettes.
-  Fry at 355 °F for 4 min before consumption.








Ingredients	Dosage [%]
Cooked floury potatoes	80
Water	16
Potato starch	3
Salt	0.65
TYLOPUR® MCE-4000	0.3
Nutmeg	0.05
<i>Total</i>	<i>100</i>

Benefits

-  Improved stability
-  Lower production costs



Pizza Pockets



-  Weigh all dry ingredients and blend well.
-  Add the oil to the blend.
-  Slowly add the oil blend to the tomato puree.
-  Place mixture in the refrigerator for 15 min, Temperature of mix should be below 70 °F
-  Mix 100 g of tomato puree with 50 g mozzarella cheese and 25 g of diced pepperoni.
-  Place 50 g of mixture on 50 g of pizza dough and form a pocket.
-  Bake in the oven at 430 °F for 11 min.








Ingredients	Dosage [%]
Tomato puree	93.6
Oil	3
Modified starch	2
TYLOPUR® MCE-4000	0.5
Herbs	0.3
Garlic powder	0.1
<i>Total</i>	<i>100</i>

Benefits

-  No leakage or breakdown of the product
-  Good succulence



Non-Dairy Whipped Cream



-  Melt the palm kernel oil at 160 °F. Stir at 200 rpm. Add emulsifiers, **Tylopur® SFE-400**, and sodium alginate to the oil phase at 160 °F, while stirring at 300 rpm for 15 min.
-  Heat the water separately to 80 °F. Add the granulated sugar. Stir the mixture at 300 rpm for 10 min.
-  Slowly add the aqueous phase to the oil phase while stirring. Stir the mixture at 350 rpm for 30 min at 160 °F.
-  Homogenize the mixture at 120 °F and 500 bar.
-  Store the mixture at 40 – 45 °F for at least 24 h.
-  Before whipping, mix 2 parts of the whipped cream with 1 part cold water of 45 °F.
-  Whip the non-dairy whipped cream for 1 min at medium speed and for 3 more min at high speed.

Ingredients	Dosage [%]
Water	44.56
Palm kernel oil	32
Sugar	22
TYLOPUR® SFE-400	0.6
Polysorbate 60	0.3
Salt	0.19
Sorbitan monostearate	0.18
Sodium alginate	0.15
Polysorbate 80	0.02
<i>Total</i>	<i>100</i>

Benefits

-  Stable creamy foam with increased overrun
-  Texture with fat-like mouthfeel

Product Information for TYLOPUR®

Description:	White to slightly off-white powder
Loss on drying:	Max. 5.0 %
Sulphated ash:	Max. 1.5 %
pH value:	5.0 – 8.0
Compliance:	Accepted food additives by EU and FDA, GRAS status, comply with FCC, GMO free, allergen free
Certificates:	FSSC 22000, ISO 9001, ISO 14001, kosher, halal
Microbiology:	Total aerobic microbial count: ≤ 100 CFU, total yeast/moulds count: ≤ 100 CFU
Nutritional:	Protein, total fat, sugars: 0 g; carbohydrate: 93.5 g; ash content: 1.5 g; NaCl: 1.2 g; Na: 0.5 g; energy: 187 kcal per 100 g
Package:	MCE/NE: 20 kg paper bag, 540 kg per pallet, SFE: 20 kg carton box, SE: 25 kg carton box

Shin-Etsu group is one of the world's leading manufacturer of cellulose ethers. We are committed to high-quality standards and continuous quality improvement. Our plants producing the Tylopur grades are located in Wiesbaden, Germany and accredited by FSSC 22000, ISO 9001 and ISO 14001.



Website: www.setylose.com/en/products/food/tylopur



LinkedIn: www.linkedin.com/company/setylose-pharma-food



YouTube channel: **Shin-Etsu Food**

For further information or samples, contact our local distribution partner or Shin-Etsu.

ShinEtsu

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