

OWERTech™ - technology of production of dehydrated food ethanol by Techinservice™ company

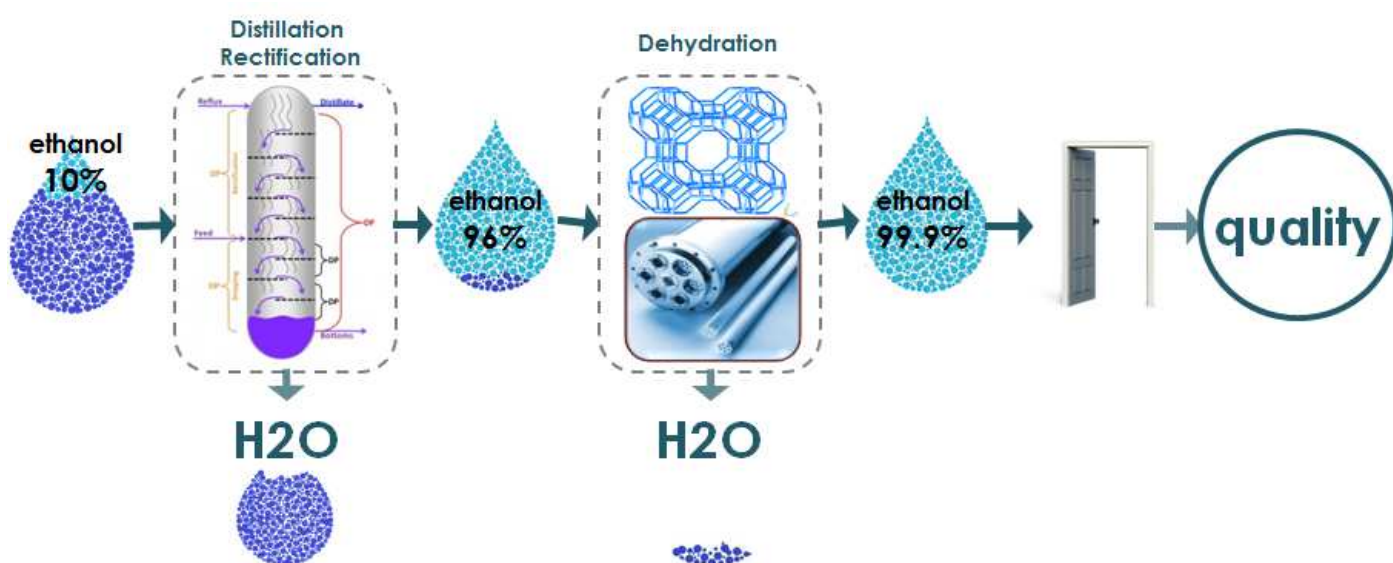
The logo for OWERTech features the word "OWERTech" in a blue, sans-serif font. The "O" and "W" are stylized, with the "W" having a unique shape. The "E" and "R" are in a lighter blue, while "Tech" is in a darker blue. The logo is positioned above a dynamic splash of water.

Basis of the OWErTech™ technology

Before the membrane method of dehydration has appeared and spread in the industry, which has allowed to dehydrate ethanol without adversely affecting its physicochemical and organoleptic properties, the purification of ethanol from impurities on classical distillation-rectification units (DRU) came to the separation (rectification) of the non binary system of ethanol - impurity (in cases of dehydrated ethanol) and by the ternary system water-ethanol-impurity. The main reason for the "non-standard behavior" of impurities with ethanol and as a consequence of the complexity of their isolation is presence of water bonds into ethanol and impurities. The change of volatility and the coefficient of rectification of impurities at different concentrations of ethanol and water necessitates the use in various section of DRU different hydroselection method, extraction, etc., in spite of which the temperature peculiarities of triple azeotropes (water-ethanol-impurity) increase the volatility and the coefficient rectification of certain impurities.

As a result of dehydration of ethanol by the membrane method and its purification (separation) the intermediate and final impurities lose their specific (double) properties and behave like main and tail impurities which makes it possible to increase the efficiency of cleaning ethanol from impurities and reduce the costs of the technological process.

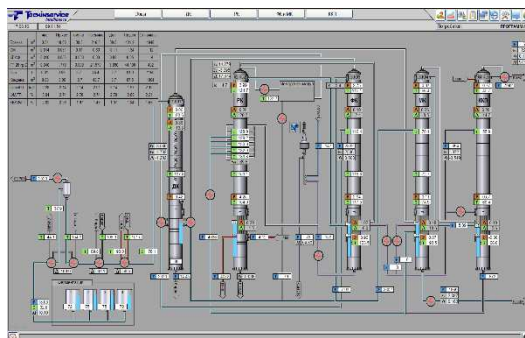
OWErTech™ technology has no analogues in the world and allows producing food ethanol with excellent organoleptic characteristics and physicochemical parameters when processing mash from starch-containing raw materials and mash from sugar-containing raw materials (molasses, syrup, sugar solution).



Development and implementation of OVERTech™ technology

2014 Development of the concept of the theoretical basis of technology

The theoretical model was created in the Techinservice software complex with using of the thermodynamic bases of the UNIQUAC and NRTL models.



2015 Laboratory testing of technology

The OVERTech™ technology has tested on the laboratory level and pilot installation in the Techinservice research and development center.



March 2015 Patent registration
Techinservice company registered a patent for a utility model:
"Industrial system to production of dehydrated food ethanol."

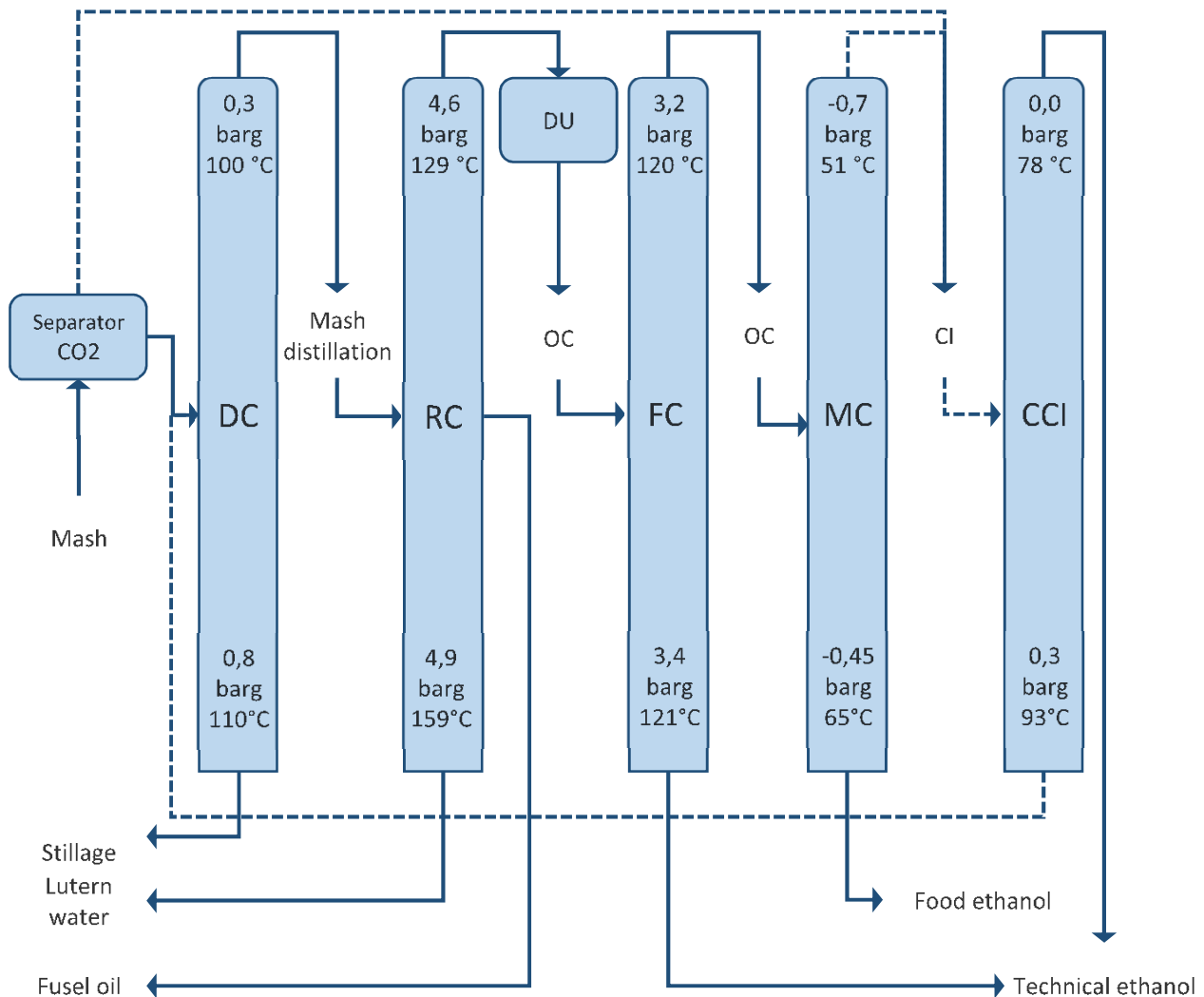


2016 Industrial introduction (commercialization) of technology

*OVERTech™ technology was successfully implemented on ethanol production of ZAHARNI ZAVODI AD (Bulgaria).
Productivity of the project is 60 000 liters per day for commercial ethanol.*



Flowchart of technology OWERTech™



DC – distillation column
RC – rectification column
MC – methanol column
FC – fusel column

EAF – ether-aldehyde fraction
CCI – column of concentration
impurities
DU – dehydration unit
DE – dehydrated ethanol

Characteristics OWERTech™ technology

name of parameter	EC Regulation 110/2008	DSTU 4221:2003 Wheaten tear	ALFA GOST P 51652- 2000	OWERTech™ technology guarantee	Expected indicators of OWERTech™ technology
Areas of use	Food industry			Food industry Pharmacy and cosmetology	
Organoleptic characteristic	The product without taste and smell, organoleptic characteristic is common to ethanol produced from the corresponding raw materials				
Volume content of ethanol, mg/litre	>96,0	>96,3	>96,3	>99,8	99,8
Mass content of free acids, mg/litre	<15,0	<8,0	<12,0	<8,0	3,0
Mass content of esters, mg/litre	<13,0	<1,5	<10,0	<1,0	not detected
Mass content of aldehydes, mg/litre	<5,0	<2,0	<2,0	<1,0	not detected
Mass content of higher ethanol, mg/litre	<5,0	<2,0	<6,0	<1,0	not detected
Mass content of methanol, mg/litre	<300,0	<50,0	<300,0	<1,0	not detected
Mass content of dry residue, mg/litre	<15,0	<5,0	-	<5,0	not detected
Permanganate test (oxidability test), mn/20 °C	-	>23,0	>20,0	>24,0	30,0

Name of parameter	unit of measure	OWERTech™ technology guarantee
output of dehydrated ethanol (DE) from the product	% from DE, recycled	>96,9
consumption of heat energy ("standard" steam)	kg per 1 liter of product	<2,1
consumption of electricity	kW per 1 liter of product	<0,15

We invite you to cooperation!

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