

## DISTILLED TALL OIL

# DTO

Forchem's Distilled Tall Oil (DTO) is a complex mixture of mainly fatty acids and rosin acids (more than 10% rosin acids). The range of products is defined by rosin acid content with 25-30% being most popular and up to 40% being possible subject to handling and storage requirements.

This unique combination of fatty acids and rosin acids can not be found in any other fatty acid and our DTO provides excellent properties for use in many chemical reactions and blended products.

Forchem's consistent growth in DTO sales in recent years has resulted from the efficiency of the production process, consistent quality raw material, and industry-leading product care which ensures our DTO is delivered in optimum condition throughout the year.

## DTO DISTILLED TALL OIL

CARBON FOOTPRINT  
Forchem DTO

92 gCO<sub>2</sub>,eq./kg

### ANALYSIS SPECIFICATION

PRODUCT	Colour Gardner	Free rosin acids, %
FOR 10	max. 6.5	9-11
FOR 20/25	max. 6.5	20-25
FOR 25/30	max. 7	25-30

### ANALYSIS TYPICAL VALUE

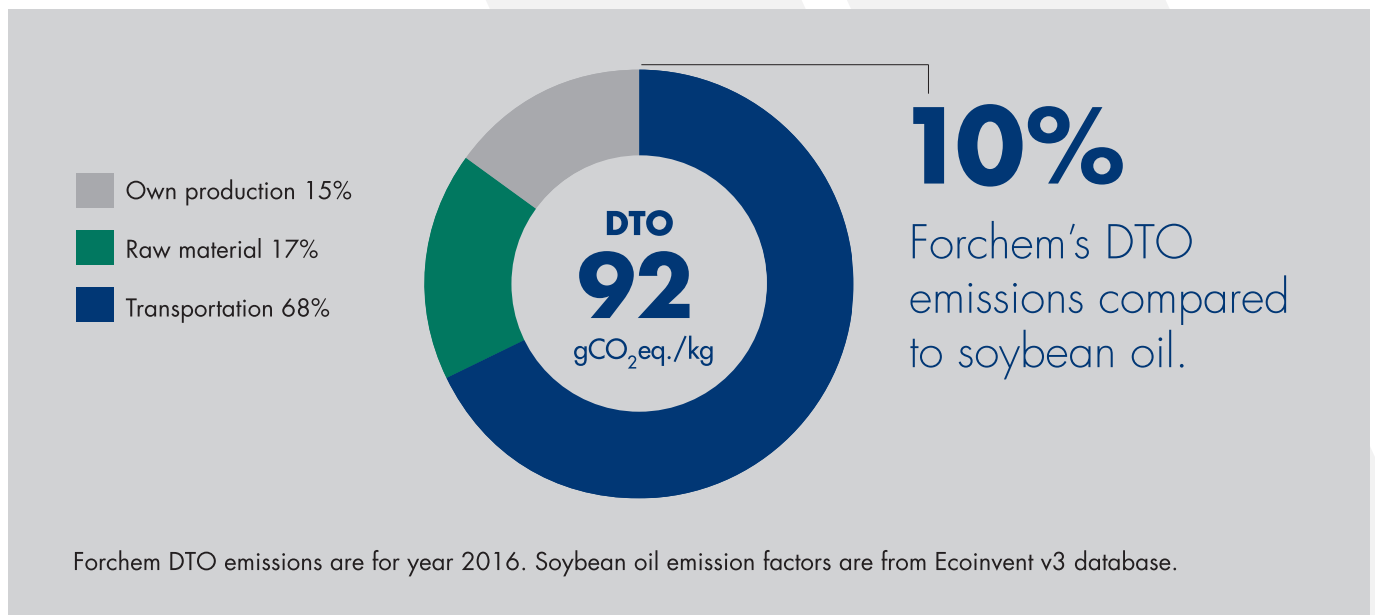
PRODUCT	Acid Value	Cloud point, °C	Colour Gardner	Density at 20 °C, kg/m <sup>3</sup>	Flash point, closed cup, °C	Free fatty acids, %	Free rosin acids, %	Pour point, °C	Refractive index, 20 °C	Saponification value	Unsaponifiables, %	Viscosity at 20 °C mPas
FOR 10	194	2	4.5	920	200	87	10	-7	1.478	196	3	50
FOR 20/25	192	5	4.5	930	200	75	22	-5	1.485	194	3	100
FOR 25/30	188	8	4.5	945	200	70	27,5	0	1.490	192	3	85

## FORCHEM DTO


### – At the forefront of low carbon solution

The limited availability of the earth's resources and growing consumer demand has turned the availability of natural resources and the state of the environment into a globally important question. Forchem tall oil products have a low carbon footprint, generating minimal volumes of greenhouse gases compared to alternative materials.

Our raw material, crude tall oil (CTO) is an industrial co-product derived from the kraft pulping process. There is no additional use of natural resources. Forchem utilizes almost entirely bioenergy, which enables climate friendly operations. The production facility is located next to a pulp mill, minimizing the emissions from raw material logistics. The European produced Forchem DTO is used to satisfy the demands of today's environmentally aware consumers and global markets.



## METHODOLOGY FOR CARBON FOOTPRINT CALCULATIONS

*gaia*  This calculation was conducted by Gaia Consulting Ltd. 2017

- Product carbon footprint is the sum of greenhouse gas emissions of a product system, expressed in CO<sub>2</sub>-equivalents.
- Calculations are conducted following the life cycle assessment standards ISO 14040 and ISO 14044.
- Emissions are for year 2016. The presented results include emissions from raw material production, transportation and operations in Rauma refinery (cradle – to gate)
- Primary data was collected and used for all processes under the control of Forchem.
- Secondary data was collected from available databases (mostly Ecoinvent v. 3.0) and used to estimate the emissions of raw material production and transportation.
- Emissions of crude tall oil production (CTO) were assumed to be 3.5 % of the emissions of sulfate pulp production. This is based on the average amount of CTO produced as side-product in sulfate pulp processes in Finland (mass basis).
- Emissions factors for average Nordic pulp mills is used for CTO originating from Nordic and Global average for CTO produced outside Nordic countries.
- This calculation was conducted in co-operation with Gaia Consulting Ltd. ([www.gaia.fi](http://www.gaia.fi)) for business-to-business purposes only.

Forchem assumes no responsibility or liability for the completeness and correctness of this analysis and this document including the data and information collected from raw material suppliers.