



QUALITY WORKS.

LANXESS Heat Transfer Fluids

Diphyl®

Dr. Wolfgang Podestà & Mercedes Bayer
Leverkusen, 2017

LANXESS
Energizing Chemistry

LANXESS – A globally operating specialty chemicals company

LANXESS
Energizing Chemistry



Specialty chemicals company

- Spin-off from Bayer in 2004
- Specialty chemicals portfolio: plastics, rubber, intermediates and specialty chemicals



Global success story

- 75 sites worldwide
- Approximately 19,200 employees in 25 countries
- Global sales of EUR ~9.2 billion in 2016*



Strategy of profitability and resilience

- Enhancing its leading position in mid-sized markets

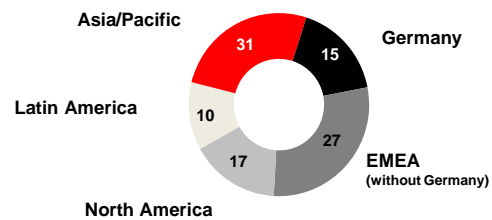
*Combined sales of LANXESS and Chemtura in 2016

LANXESS Heat Transfer Fluids, Leverkusen 2017

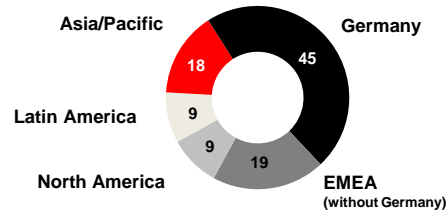
LANXESS

Global presence

**Sales per region
(2016, in %)**



**Employees per region
(2016, in %)**



Global production network



LANXESS with new strategic focus: Building a more balanced company

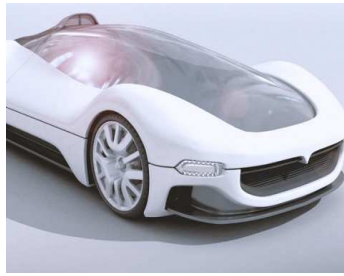
LANXESS AG



Advanced Intermediates



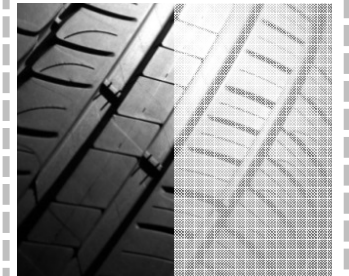
Performance Chemicals



Engineering Materials



Specialty Additives



ARLANXEO*
joint venture for
synthetic rubber

More resilient
Strong cash generation
Solid platform for growth

*ARLANXEO to be fully consolidated by LANXESS for the first three years

LANXESS Distribution GmbH

Your Contact



Technical:

Dr. Wolfgang Podestà
Business Manager Baynox & Diphyl
Phone: +49 (0)221 8885 4524
Mobile: +49(0)175 30 19 124
wolfgang.podesta@lanxess.com

Commercial:

Mercedes Bayer
Product Manager
Phone: +49 (0)221 8885 5483
Mobile: +49 (0) 151 74 61 3104
mercedes.bayer@lanxess.com

LANXESS Distribution GmbH
Kaiser-Wilhelm-Allee 40
Building K10
51369 Leverkusen, Germany

LANXESS Distribution Markets

Industrial Markets

Rubber



Construction



Coatings



Water Sector



Metal treatment



Synthesis Chemicals

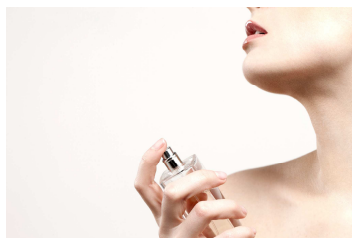


Personal Care / F&F

Personal Care



Flavour & Fragrances (F&F)

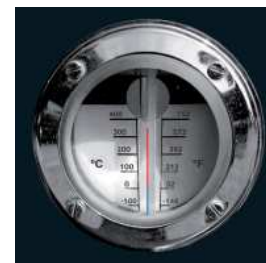


Speciality Markets

Fuel Additives



Heat Transfer Fluids



Animal Nutrition



LANXESS Heat Transfer Fluids Portfolio

Diphyl® THT

HTF for high temperatures, application in liquid phase

Diphyl® KT

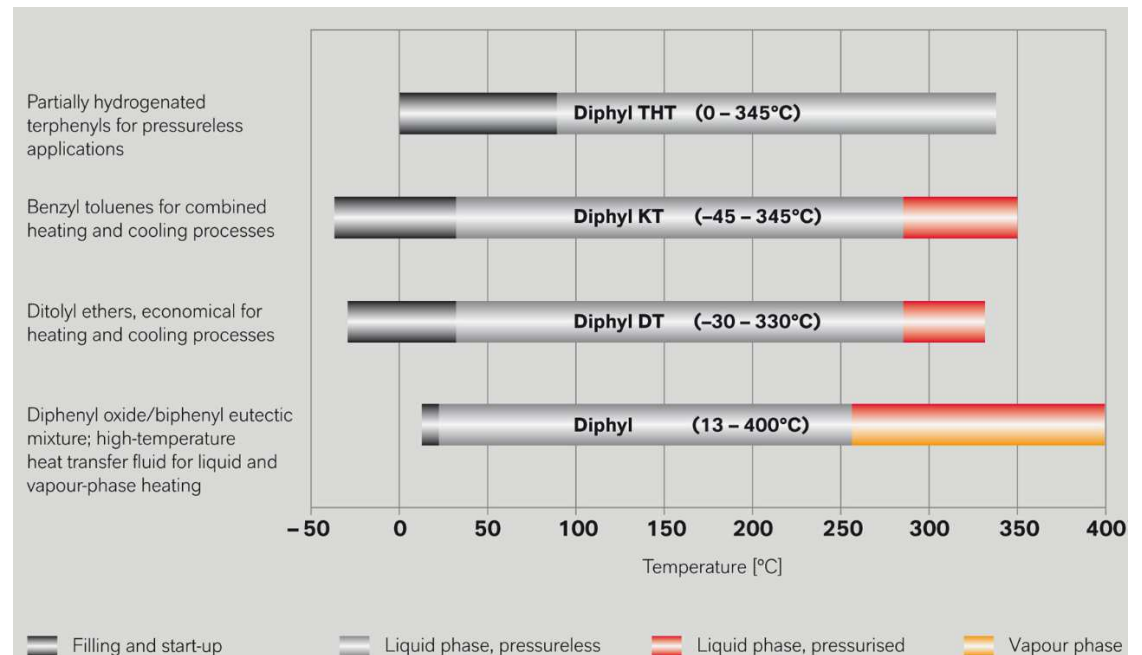
HTF for low to high temperatures, pressure (less) application in liquid phase

Diphyl® DT

HTF for low to medium temperatures, pressure (less) application in liquid phase

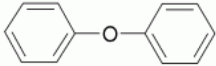
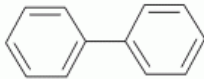
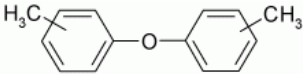
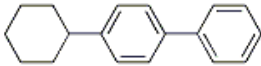
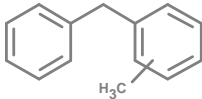
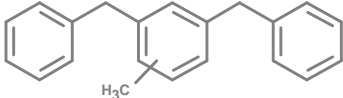
Diphyl®

HTF for very high temperatures, pressure (less) application in liquid/ vapour phase



DPO and DP: Tailor made products

Alkylated aromatics often arise as co-products

HTF Components	Chemical Structure	Main Process
Aromatics	 <ul style="list-style-type: none">▪ Diphenyl oxide (DPO)	<ul style="list-style-type: none">▪ Dedicated manufacturing processes
	 <ul style="list-style-type: none">▪ Diphenyl (DP)	<ul style="list-style-type: none">▪ Dedicated manufacturing processes
	 <ul style="list-style-type: none">▪ Ditolyether	<ul style="list-style-type: none">▪ Cresol process
	 <ul style="list-style-type: none">▪ Hydrogenated Terphenyl incl. o/m isomers	<ul style="list-style-type: none">▪ Diphenyl process + Hydrogenation
Alkylated Aromatics (examples)	 <ul style="list-style-type: none">▪ Monobenzyl toluene	<ul style="list-style-type: none">▪ Ethylbenzene process (Styrene– Polystyrene production)
	 <ul style="list-style-type: none">▪ Dibenzyl toluene	<ul style="list-style-type: none">▪ Cumene process (Phenol production)

LANXESS Heat Transfer Fluids

Major Applications

Polymers	Chemicals	Processing
Polyesters (e.g. PET, PBT)	Sodium monobenzothiazole	Textile finishing
Polyester resins	Aniline	MSA production
ABS	Benzene refining	Phthalic anhydride melting
Polyamide 6/66	Chlorinated hydrocarbons	Heavy oil operations
Polyethylene/Polypropylene	Fatty acid esters	High octane distillation
Polystyrene	Silicones	Anthracene distillation
Thermoplastic rubber	Organic pigments	TDI condensation
Lacquers	Vinyl chloride/acetate	Nuclear reactor cooling
Oil varnish	Dioctyl/butyl phthalate	Solartherm* / E-energy

* Concentrated Solar Power is a major application which is explained in detail in a separate presentation

LANXESS Heat Transfer Fluids

Experience & Knowledge

- Bayer patented Diphyl (DP / DPO eutectic) in 1929
- German technology & production facilities
- Comprehensive knowledge on the technical design of such installations
- Worldwide network of customers and research companies (> 200 plants)
- Development of standards/ methods for HTF jointly with external institutes
- Experience within CSP projects for more then 10 years (initial filling & top up)
- Cooperation in CSP with engineering companies and DLR*
- High-tech laboratories and test facilities for HTF analytics (Currenta)
- Cooperation with leading contractors and plant construction companies
- Worldwide contacts to pharmaceutical, chemical & polymer industries

* Deutsches Zentrum für Luft- und Raumfahrt / National aeronautics & space research centre



LANXESS Heat Transfer Fluids

Comparison of synthetic HTF with identical composition

Please contact LANXESS for detailed information.

LANXESS Heat Transfer Fluids

Comparison of low cost synthetic HTF (alternatives for mineral oil)

Please contact LANXESS for detailed information.

LANXESS Heat Transfer Fluids

Safety

- To date, there are no harmful effects resulting from the use of Diphyl® as HTF
- Detailed guidelines and information are included in the corresponding safety data sheets
- These data sheets include detailed information on:
 - The chemical properties of the Diphyl® HTF, toxicological and ecological aspects
 - Physical and safety-related properties, e.g. flash point and autoignition temperature
 - Transport
 - Technical and personal protective measures
 - Storage and handling
 - Procedures in the event of accidents



LANXESS Heat Transfer Fluids

Pre and After Sales Activities

Technical support

- Experienced LANXESS experts offer worldwide technical support
- Worldwide network of plant engineering companies, subcontractors and research companies
- Support during selection of suitable Heat Transfer Fluid for initial filling
- Calculations regarding plant configuration are provided by LXS
- Technical support & advice after initial filling
- Support for analytical testing

LANXESS Heat Transfer Fluids

Pre and After Sales Activities

Commercial support

- Large storage capacities in Europe and Asia
- Short term deliveries
- Selection of packaging (drums, IBCs, ISO Tanks)
- Delivery in heatable ISO Tanks > 40°C
- Extensive Know How for demanding logistic solutions (CSP projects)
- Strong logistic network (flexible, delivery time & volume), experienced in CSP projects
- Sustainable solutions are offered (regeneration of used HTF on global basis)

LANXESS Heat Transfer Fluids

Marketing Activities

Exhibitions

- CSP Conference, Beijing 23-24.03.2017
- WTS Seminar, Wiesloch 26-27.04.2017
- Menasol, Dubai 25-26.04.2017
- Khimia, Moscow 23-26.10.2017
- CSP Conference, Sevilla November.2017

Marketing Activities

- Industry-specific articles
- Brochures
- Customer Workshops

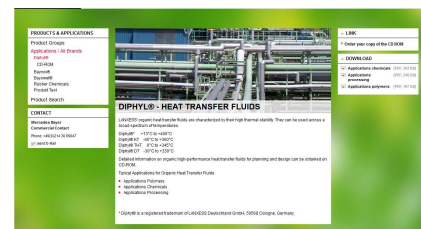
■ WWW.DIPHYL.COM

■ <https://webmagazine.lanxess.com/category/made-by-lanxess/>



When it gets hot, it's time for Diphyl

Heat is needed for production almost everywhere, in every industry. Temperatures often rise as high as 400° Celsius or higher. Many production processes are not viable without heat transfer fluids, which allow the heat to be passed on to the next station and not be lost. As a result, many production plants depend on organic heat transfer fluids, such as Diphyl by LANXESS.



LANXESS Heat Transfer Fluids

Corporate Responsibility

Integration of Corporate Responsibility in the overall LANXESS strategy



- Signatory to the U.N. Global Compact



- Climate A List
- Sector Leader „Energy & Materials“



FTSE4Good

- Member of FTSE4Good



- 9001 & 14001: Global matrix certificate



- Signatory of the Responsible Care® Global Charter

MEMBER OF
Dow Jones
Sustainability Indices
In Collaboration with RobecoSAM

- Member of the Dow Jones Sustainability Index (World)



THE CHEMICAL INITIATIVE FOR
SUSTAINABLE SUPPLY CHAINS

Joint initiative of international chemical companies for sustainable supply chains in the chemicals industry*

- Improving the sustainability and transparency supply chain
- Monitoring compliance with the “Supplier Code of Conduct”
- Sustainability assessment and joint audits

* Members include: Akzo Nobel, Arkema, BASF, Bayer, Clariant, Covestro, DSM, Eastman, Evonik, Henkel, IFF, LANXESS, Merck, Solvay, Syngenta, Wacker.

LANXESS

A thick red horizontal bar is positioned below the 'LAN' portion of the 'LANXESS' logo.

Energizing Chemistry

Disclaimer

Health and Safety Information: Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. For materials mentioned which are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be followed. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets, product information and product labels. Consult your LANXESS representative in Germany or contact the Regulatory Affairs and Product Safety Department of LANXESS Deutschland GmbH or - for business in the USA - the LANXESS Product Safety and Regulatory Affairs Department in Pittsburgh, PA, USA.

Regulatory Compliance Information: Some of the end uses of the products described in this publication must comply with applicable regulations, such as the FDA, BfR, NSF, USDA, and CPSC. If you have any questions on the regulatory status of these products, contact – for business in the USA- your LANXESS Corporation representative, the LANXESS Regulatory Affairs Manager in Pittsburgh, PA, USA or for business outside US the Regulatory Affairs and Product Safety Department of LANXESS Deutschland GmbH in Germany.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information.

Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.