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Ergoplast® DOT

CHEMICAL NAME: bis(2-ethylhexyl) terephthalate; abbr. **BEHT**

OTHER NAMES: bis(2-ethylhexyl) benzene-1,4-dicarboxylate; IUPAC name

di(2-ethylhexyl) terephthalate; abbr. **DEHT**

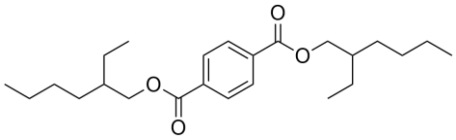
dioctyl terephthalate; abbr. **DOT** or **DOTP**

CAS REGISTRY NUMBER: **6422-86-2**

EC NUMBER: **229-176-9**

MOLECULAR FORMULA: **$C_{24}H_{38}O_4$**

STRUCTURAL FORMULA:



PROPERTIES

Ergoplast® DOT is a clear and colorless, oily liquid with hardly noticeable odor. It is obtained by the reaction of 2-ethylhexyl alcohol with terephthalic acid, and as a highly lipophilic ester is insoluble in water (solubility < 0.1 mg/dm^3 at 22.5°C)[1].

The main component of Ergoplast® DOT – di(2-ethylhexyl) terephthalate belongs to the group of non-phthalate plasticizers, which are an alternative to toxic di(2-ethylhexyl) phthalate [abbr. DEHP][2]. From a chemical point of view, DEHT is a constitutional isomer of DEHP. Therefore, it is a proper substitute for phthalic ester, with reduced toxicity. DEHT is also characterized by volume resistivity comparable to DEHP (above 10^{11} Ω·cm; which ensures good electrical insulation), and similarly provides great mechanical properties (incl. flexibility) to the plasticized material at low temperatures [up to ca. -30°C for polyvinyl chloride (PVC)][3]. Furthermore, terephthalate ester has lower volatility and is resistant to water extraction.

On the one hand, di(2-ethylhexyl) terephthalate is hydrolytically stable at the pH range of 4 to 9 (ECHA; OECD test no. 111)[4]. On the other hand, the compound is readily biodegradable in water by domestic activated sludge: ca. 73% in 28 days (ECHA; met. OECD 301 B)[5].

PHYSICOCHEMICAL PARAMETERS

Parameter	Unit	Required value	Test method
Color in Pt – Co scale (APHA color)	Hazen units	max. 30	PN-EN ISO 6271-1:2006 PN-C-04534-01:1981 ISO 2211
Density at 20 °C	g/cm^3	0.980 – 0.985	PN-EN ISO 12185:2002 PN-C-04504:1992 DIN 51 757
Refractive index n^{20}_D	-	1.4900 – 1.4915	PN-C-89401:1988 DIN 51 423
Acidity, as terephthalic acid	%	max. 0.01	PN-C-89401:1988
Flash point	°C	min. 220	PN-EN ISO 2592:2008
Volatile matter (temp. 100 °C for 6 hours)	%	max. 0.3	PN-C-89401:1988
Water content	%	max. 0.1	PN-C-04959:1981 PN-ISO 760:2001 DIN 51777
Bis(2-ethylhexyl) terephthalate content	% by peak area	min. 98.0	GC – FID

APPLICATIONS

Ergoplast® DOT is mainly used for PVC plasticization. However, as a general-purpose plasticizer, it can be applied to soften polymers and resins such as polyvinyl chloride acetate, cellulose derivatives and nitrile butadiene rubber (NBR)[6]. Terephthalic ester works best in the role of sole plasticizer as well as it is relatively compatible with our other plasticizers - Ergoplast® DOA [bis(2-ethylhexyl) adipate], Ergoplast® DOS [bis(2-ethylhexyl) sebacate] and Ergoplast® ES (epoxidized soybean oil).

Exemplary products that contain bis(2-ethylhexyl) terephthalate:

- PVC plastisol*, e.g. used in flooring[7] and coatings;
- electrical wire insulation[7];
- medical devices; incl. infusion and transfusion sets[8] (blood bags)[9];
- children's toys (teethers)[10];
- nail polishes[7].

* The addition of DEHT gives a low initial viscosity and stabilizes it well. That extends the potential shelf life of the plastisol.

We recommend using the Ergoplast® DOT in the manufacturing of electric wires and cables insulation, garden hoses, soft goods, footwear, PVC floor coverings, car parts, medical devices, children's toys, plastics used in food packaging and as a component of adhesives, sealants, paints or varnishes.

FOOD CONTACT

We also declare that the offered product meets the requirements set out in the Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food.

Di(2-ethylhexyl) terephthalate is included in the Union list of authorised monomers, other starting substances, macromolecules obtained from microbial fermentation, additives and polymer production aids (Annex I to the commission regulation indicated above; item 798)[11].

FCM substance No	Ref. No	CAS No	Substance name	Specific migration limit SML [mg/kg]
798	92200	6422-86-2	terephthalic acid, bis(2-ethylhexyl)ester	60

PACKAGING AND TRANSPORT

Ergoplast® DOT transport is carried out in tankers, tank trucks, IBC tanks and customer's unit containers. Covered means of transport should be used to transport unit containers. Ergoplast® DOT should not be transported together with oxidizing agents or strong alkalis.

It is recommended to limit exposure to sunlight with a storage temperature of up to 30°C.
The warranty period is 12 months from the date of production.

CONTACT

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LITERATURE REFERENCES

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