

Plastomoll® DOA

Edition dated July 2019

Valid for product produced in Ludwigshafen only

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® = Registered trademark of BASF SE

Plasticizer for PVC, surface coatings, and rubber. Plastomoll® DOA is especially suited for flexible PVC colorants and coatings requiring good low temperature properties. Plastomoll® DOA meets the requirements for food packaging and can therefore be used for flexible PVC films for food contact (cling film).

Chemical nature

Adipic acid ester of 2-ethylhexanol; di-(2-ethylhexyl)adipate; di-octyladipate

Molecular formula	C ₂₂ H ₄₂ O ₄
CAS number	103-23-1
EC number	203-090-1
Abbreviation (DIN EN ISO 1043-3)	DOA (DEHA)

Delivery specification

Property	Value	Unit	Test method DIN/ASTM
Dynamic viscosity* at 20 °C	13 – 15	mPa · s	ASTM D 7042
Density* at 20 °C	0.924 – 0.926	g/cm ³	DIN 51757 ASTM D 4052
Platinum-cobalt color	20 max.		DIN EN ISO 6271 ASTM D 1209
Refractive index* n_D^{20}	1.446 – 1.448		DIN 51423-2 ASTM D 1045
Acid value	0.07 max.	mg KOH/g	DIN EN ISO 2114 ASTM D 1045
Ester content	99.5 min.	% by area	GC-method BASF
Water content	0.1 max.	% by weight	DIN 51777, Part 1 ASTM E 203

*These properties are not measured routinely.

Properties

Plastomoll® DOA is a nearly colorless, clear and practically anhydrous liquid with a hardly noticeable odor. It is soluble in the usual organic solvents and is miscible and compatible with all monomeric plasticizers commonly used in PVC. Plastomoll® DOA is almost insoluble in water.

In view of its good behavior at low temperatures, Plastomoll® DOA is particularly suitable for use in the manufacture of plasticized PVC products with good low-temperature flexibility.

PVC plastisols containing Plastomoll® DOA have a low initial viscosity and are easy to process. They have a long shelf life.

Plastomoll® DOA is listed for use in food-contact applications. Information on its regulatory status according to food-contact legislation is available in a separate document that we would be pleased to send you on request.

Physical data

The following physical data were measured in the BASF SE laboratories. They do not represent any legally-binding guarantee of properties for our sales product.

Molar mass	370.6 g/mol
Pour point (DIN ISO 3016)	< -60 °C
Solution temperature at the clear point (5 % S-PVC, K-value 71; DIN 53408)	148 °C
Surface tension 20 °C (DIN EN 14370)	30.3 mN/m

Vapor pressure	T [°C]	p [hPa]
	50	1.1 · 10 ⁻⁵
	60	4.6 · 10 ⁻⁵
	70	1.6 · 10 ⁻⁴
	80	5.1 · 10 ⁻⁴
	90	1.5 · 10 ⁻³
	100	3.9 · 10 ⁻³
	120	0.02
	140	0.10
	160	0.37
	180	1.2
	200	3.3
	220	8.3
	240	18.8
	260	39.5
	270	77.6
Antoine constants for (p in bar; T in °C)	ln (p) = A + B / (C + T)	
	A = 11.4144	
	B = - 6067.83	
	C = 154.33	

(The Antoine constants were determined from vapor pressure data measured in the temperature range of 148 °C to 312 °C by a dynamic method in an argon atmosphere. The values in the table were calculated using the Antoine equation. The data serve only as a rough guide.)

Density and viscosity dependent on temperature

Temperature [°C]	Density* ρ [g/cm ³]	Dyn. Viscosity** η [mPa · s]
0	0.9405	33.9
10	0.9330	20.7
20	0.9255	13.7
30	0.9180	9.6
40	0.9105	7.0
50	0.9030	5.4

* Calculated using the following equation: $\rho = (-0.00075 \cdot t + 0.94053)$ from data measured by BASF SE. (ρ = Density in g/cm³, t = Temperature in °C)

** Calculated according to Schwen and Puhl ([1], Formula 24) from data measured by BASF SE.

Specific heat C_p (DSC) according to DIN 51007

Temperature [°C]	Specific heat C_p [J/(g · K)]
20	1.84
60	1.97
100	2.09

Storage & Handling

Plastomoll® DOA can be stored in tanks and drums constructed from normal carbon steel, e. g. A 283 grade. If severe demands are imposed on the product quality, we recommend to store it in tanks constructed from stainless steel, e. g. AISI TP 316 Ti (German steel No. 1.4541) or aluminum (AlMg3).

It is recommended to take steps to ensure the exclusion of atmospheric moisture, e. g. by storing under a blanket of dry nitrogen, as otherwise the product quality may deteriorate, e. g. the water fraction may rise, or the Plastomoll® DOA may be discolored by rust in normal steel tanks.

Drums containing the product should be kept tightly closed in a well-ventilated place.

Plastomoll® DOA can be stored for one year in its original packaging at temperatures below 40 °C, if moisture is excluded. Only dedicated equipment should be used to discharge this product.

Pumps:

Cast-steel centrifugal pumps with a simple slip-ring seal are suitable.

Flange seals:

An example of a suitable material for seals is chemical-resistant Polytetrafluoroethylene (PTFE). Other plastics should be checked for suitability before they are taken into use.

Literature

[1] Schwen, R. and Puhl, H.

“Fehlersuche bei Viskosität-Temperatur-Messungen”, Erdoel und Kohle-Erdgas-Petrochemie, Vol. 45, April 1992:

Part A: “Problematik, Formelpaket und mathematisches Procedere”, issue 4, pages 161 ff.

Part B: “Resultate, Nuetzlichkeit”, issue 6, pages 253 ff.

Safety

When using this product, the information and advice given in our **Safety Data Sheet** should be observed. Due attention should also be given to the **precautions** necessary for handling chemicals.

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

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