

# Product Bulletin

**supresta™**  
BUILT-IN DEFENSE

**Phosflex® 390**

MARKETED BY  
**HARWICK STANDARD**  
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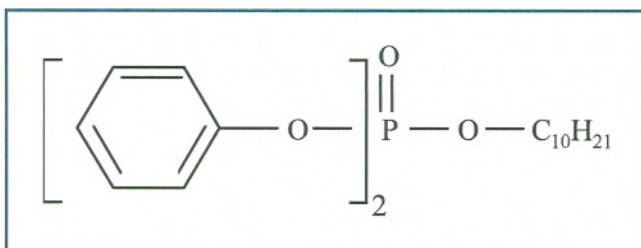
**Phosflex®**  
Flame Retardant Plasticizers

**Chemical Name:** Isodecyl diphenyl phosphate

## CAS #

Isodecyl diphenyl phosphate 29761-21-5

Triphenyl phosphate 115-86-6



## Overview

Phosflex® 390 is isodecyl diphenyl phosphate made from synthetic feedstocks. It is a highly efficient plasticizer for PVC, with very good low temperature flexibility, and excellent solvating properties for fast fusion.

One of the unique characteristics of Phosflex® 390 is its ability to reduce flammability while also reducing smoke. Typically when flame retardants are used, the combustion efficiency of the compound is decreased and as a result, smoke (incomplete combustion particles and gases) increase. Phosflex® 390 does both exceeding well in many types of polymer systems, especially flexible vinyl and vinyl alloys.

Phosflex® 390 has excellent compatibility in PVC and other plastics. Formulated correctly, this product performs well in vinyl composites for outdoor applications where exposure to UV irradiation and weathering is critical. Phosflex® 390 has been found useful in FR foamed vinyl and vinyl alloys (PVC/nitrile rubber), calendared sheet goods, vinyl wire and cable and outdoor PVC applications. In certain elastomers, Phosflex® 390 can be useful as a solvator to improve the tactile feel of the rubber composites.

## Phosflex® Product Selector

	Key applications	Key characteristics
4	<ul style="list-style-type: none"> <li>Primary plasticizer for nitro-cellulose, chlorinated rubber</li> <li>Anti-foam agent</li> </ul>	<ul style="list-style-type: none"> <li>Low viscosity</li> <li>Low density</li> </ul>
31L	<ul style="list-style-type: none"> <li>PVC film and sheet compounds</li> <li>Dispersant for plastisols</li> </ul>	<ul style="list-style-type: none"> <li>Low color</li> <li>Blendable with non-FR plasticizers</li> </ul>
41L	<ul style="list-style-type: none"> <li>PVC film and sheet compounds</li> <li>Dispersant for plastisols</li> </ul>	<ul style="list-style-type: none"> <li>Low color</li> <li>Blendable with non-FR plasticizers</li> </ul>
71B	<ul style="list-style-type: none"> <li>Flame retardant plasticizer for PVC</li> </ul>	<ul style="list-style-type: none"> <li>Excellent flame retardant properties</li> <li>Low volatility</li> </ul>
362	<ul style="list-style-type: none"> <li>Flame retardant plasticizer for PVC alloys</li> </ul>	<ul style="list-style-type: none"> <li>Low temperature and low smoke</li> <li>Excellent vinyl solvating properties</li> <li>Approved for packaging materials in food contact</li> </ul>
390	<ul style="list-style-type: none"> <li>Flame retardant plasticizer for PVC sheets and coatings</li> </ul>	<ul style="list-style-type: none"> <li>Excellent low temperature flexibility</li> <li>Low smoke, good weathering properties</li> </ul>
314, 318, 321, 327	<ul style="list-style-type: none"> <li>Blended plasticizer for film and sheet vinyl goods</li> </ul>	<ul style="list-style-type: none"> <li>High efficiency</li> <li>High solvating</li> </ul>



## Key Applications

### Formulations for Flexible Suspension PVC at 50 phr Plasticizer

	1	2	3	4	5
PVC Geon (103EP)	100	100	100	100	100
CaCO <sub>3</sub>	50	50	50	50	50
Zinc Borate (Firebrake ZB)		3	6	3	6
ATH (Hydral 710)				20	40
Plasticizers	50	50	50	50	50
ESO (Plastoflex 2307)	5	5	5	5	5
Stabilizers (Ba/Zn mixed metals)	5	5	5	5	5
Totals (parts)	210	213	216	233	256

These five formulations represent basic formulation and component variations typically seen for FR-PVC. The resultant flammability and physical properties are shown in the following tables with comparisons to similar flame retarded vinyl systems.

### Phosflex® 390 in PVC Suspension Resin (GEON 103GP)

Component	Additive phr	Tensile Properties			Hardness		LOI 100 Mils	UL-94 1.6mm
		Strength psi (MPa)	E Mod. psi (MPa)	Elong. %	Shore "A" Initial	Creep (15 sec.)		
DIDP	50	1844(12.7)	858(5.9)	426	88	85	23	FAIL
ZB	3	2018(13.9)	907(6.2)	461	88	84	23.2	FAIL
ZB	6	1824(12.6)	906(6.2)	417	90	86	23.2	FAIL
ZB/ATH	3/20	1635(11.3)	945(6.5)	359	91	86	23.6	FAIL
ZB/ATH	6/40	1715(11.8)	1081(7.4)	374	93	89	25	FAIL
Phosflex® 390	50	1608(11.1)	752(5.2)	373	86	83	27.2	V-0
ZB	3	1320(9.1)	756(5.2)	291	88	84	27.8	V-0
ZB	6	1510(10.4)	777(5.4)	352	90	86	28	V-0
ZB/ATH	3/20	1535(10.6)	863(5.9)	364	91	86	28.2	V-0
ZB/ATH	6/40	1460(10.1)	995(6.9)	336	93	89	29.6	V-0



## Typical Properties

Physical appearance	Clear, transparent liquid
Phosphorus content, wt. %	7.9
Specific gravity, 20°C/20°C	1.070
Density @ 20°C, lbs/gal	8.9
kg/m <sup>3</sup>	1070
Viscosity @ 25°C, mPa.s	26
Acidity, as phosphoric acid, %	0.10
Water content, wt. %	0.10
Color, APHA	<100

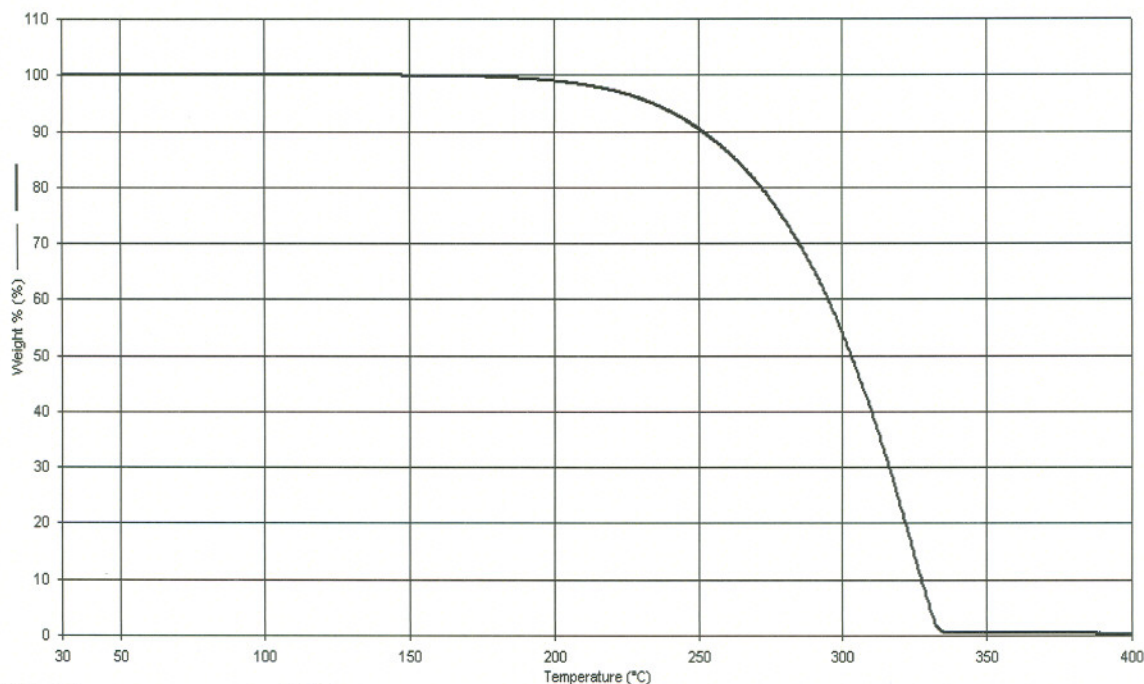
## Safety & Handling

Consult the Material Safety Data Sheet for this product.

## Shipping Information

Available in bulk tank trucks, isocontainers, 2,300 lb totes, and 480 lb drums.

## Thermogravimetric Analysis: Phosflex® 390 (10°C rise/minute in nitrogen)



2% wt. Loss	204°C
5% wt. Loss	221°C
10% wt. Loss	234°C

For more information about our products and to place an order, please contact one of Supresta's regional sales offices.

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