



**EVALUATION OF NEW SCIENTIFIC EVIDENCE CONCERNING
THE RESTRICTIONS ON DINP AND DIDP CONTAINED IN
ENTRY 52 OF ANNEX XVII TO REGULATION (EC)
No 1907/2006 (REACH)**

FINAL REPORT

VOLUMES OF DINP AND DIDP

**CONTRACT NUMBER ECHA/2011/96 (SR32) IMPLEMENTING FRAMEWORK
CONTRACT NO ECHA/2008/2**

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1 Introduction

1.1 The project

The European Chemicals Agency (ECHA) has let a contract to provide ‘Services to gather information on volumes and uses of DINP and DIDP, and carry out partial exposure assessment’. This contract has been let under Framework ECHA/2008/02 between ECHA and AMEC Environment & Infrastructure UK Limited (AMEC). The technical work has been led by COWI, supported by IOM, BRE and AMEC.

The service concerns the following phthalates:

DINP

1,2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich; EC No. 271-090-9; CAS No. 68515-48-0 (in the literature often referred to as “DINP-1”), and

Di- “isononyl” phthalate; EC No. 249-079-5; CAS No. 26761-40-0 (in the literature often referred to as “DINP-2”).

DIDP

1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich; EC No. 271-091-4; CAS No. 68515-49-1, and

Di-“isodecyl” phthalate, EC No. 247-977-1; CAS No. 68515-48-0.

The first task related to the provision of data on manufacturing and import, presence in articles and migration rates for the two phthalates. The findings from this task are presented in this report.

1.2 Purpose of this report

According to Annex XVII of REACH, the phthalates DINP and DIDP are currently restricted for use in some toys and childcare articles. The substances shall not be used as substances or as constituents of preparations, at concentrations higher than 0.1 % by mass of the plasticised material, in toys and childcare articles which can be placed in the mouth by children.

The Commission is required, according to Annex XVII, to re-evaluate the measures provided for in relation to this point in the light of new scientific information on such substances and their substitutes and, if justified, these measures shall be modified accordingly.

The objective of the service is to support ECHA in the 2nd phase of the review of the existing restriction set out in Annex XVII of REACH. The overall objective is to draw conclusions on whether information appears to justify keeping the current restrictions on DINP and DIDP as they are, expanding them with further restrictions, or lifting them.

The specific objective of the service is to have supporting data collected and reviewed.

1.3 Stakeholder consultation

As part of the data collection, a number of stakeholders have been contacted and sources of data reviewed. As concerns the part of the service, which is reported in this report, information has been collected from the European Council for Plasticisers and Intermediates, ECPI.

2 Types of DINP and DIDP

2.1 DINP

There are currently two different DINP products that are marketed:

- DINP-1 (CAS 68515-48-0) is manufactured by the “Polygas” process.
- DINP-2 (CAS 28553-12-0) is n-butene based. (ECB, 2003b).

The EU RAR furthermore describes a third form, DINP 3 (also CAS 28553-12-0), which has reportedly been discontinued.

According to ECPI (2011b) DINP is composed of different alcohol chains depending on production method. It is a manufactured substance made by esterifying phthalic anhydride and isononanol. Isononanol is composed of different branched C₉ alcohol isomers. The two branches on the molecule R1 and R2 are not necessary identical, and are either mainly C₈H₁₇ to C₁₀H₂₁ (DINP-1) or C₉H₁₉ isomers (DINP-2). In the case where R1 and R2 are C₉H₁₉ isomers (DINP-2), it is 10% n-nonyl, 35-40 % methyloctyl, 40-45 % dimethylheptyl and 5-10 % methylethylhexyl.

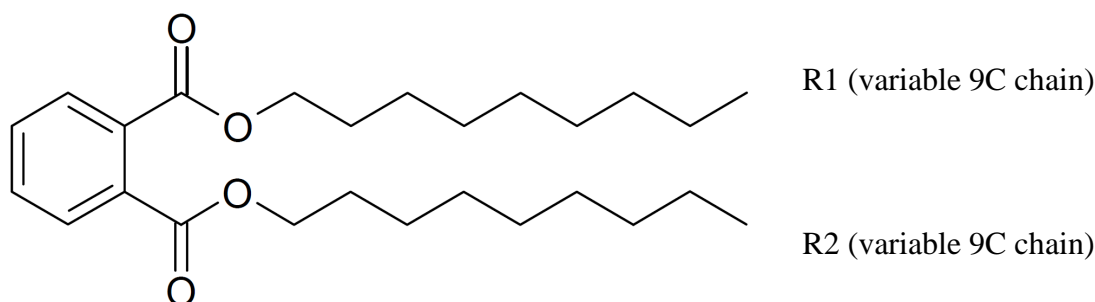


Figure 2.1 Structure of DINP, CAS No 68515-48-0 (ECB, 2003b)

The percent composition of the different chain structures of the two forms of DINP is shown in Table 2.1.

DINP-1 (68515-48-0) contains alcohol groups made from octane, by the “polygas” process (ECB 2003b). At least 95 percent of these alcohol groups comprise roughly equal amounts of 3,4-, 3,5-, 3,6-, 4,5-, 4,6-, and 5,6-dimethyl heptan-1-ol (Hellwig *et al.*, 1997 as cited by Babich and Osterhout, 2010). DINP-1 is also known by the tradename Jayflex®.

DINP-2 (28553-12-0) contains alcohol groups made from n-butene, which results mainly in methyl octanols and dimethyl heptanols. DINP-2 is also known by the tradenames Palatinol N® and Palatinol DN® (NLM 2009a). DINP-3 (also 28553-12-0) contains alcohol groups made from n-butene and i-butene, resulting in 60 percent methylethyl hexanols. DINPs generally contain 70% or more nonyl alcohol moieties, with the remainder being octyl or decyl (Madison *et al.* 2000 as cited by Babich and Osterhout, 2010).

Although their isomeric composition differs, the different types of DINP are considered to be commercially interchangeable. (Babich and Osterhout, 2010).

Table 2.1 Best estimate of content (%) of the different chain structures of the DINPs (ECB, 2003b)

	DINP-1	DINP-2
Methylethyl hexanols	5 - 10	5 - 10
Dimethyl heptanols	45 - 55	40 - 45
Methyl octanols	5 - 20	35 - 40
n-Nonanol	0 - 1	0 - 10
Isodecanol	15 - 25	--

2.2 DIDP

DIDP is a complex mixture containing mainly C10-branched isomers (ECB, 2003a). DIDP is marketed under two CAS numbers. No data on the differences between the types of DIDP has been identified and the EU RAR (ECB, 2003a) does not distinguish between the different forms (unlike the RAR for DINP).

The correct structures can only be estimated. Based on nonene (CAS 97593-01-6) isomer distribution analysis and ¹H-NMR analysis of isodecyl alcohol, the EU RAR provides an estimation of key isomeric structures of isodecylalcohol and hence of DIDP, as shown in Table 2.2. The lower ranges do not add up to 100% indicating that the substance may include other chain lengths.

Table 2.2 Best estimates of the different chemical structures of DIDP (ECB, 2003a)

Longest chain (estimates)	DIDP (CAS 68515-49-1 & CAS 26761-40-0)	Best estimated content (%)
C7	tri-methyl heptanols	0-10
C8	di-methyl octanols	70-80
C9	methyl nonanols	0-10
C10	n-decanol	0

3 Manufacturing, import and export of DINP and DIDP

3.1 Overview

The following section provides data on manufacturing of DINP and DIDP in the EU, import/export of the substances on their own and an estimate of the import/export of the substances in finished articles. The data are summarised in Figure 3.1

The import/export of the substances on their own may be slightly overestimated as the data from the statistics include all C9/C10 phthalates. This is further discussed in the following section.

The import/export within articles is quite uncertain as discussed later, but the export in articles seems to be significantly higher than the imports.

No data on import/export in mixtures have been identified but, as mixtures account for less than 10% of the EU consumption for processing, the import/export in mixtures is considered to be small compared with the import/export in articles. They are thus not expected to have a major influence on the total balance.

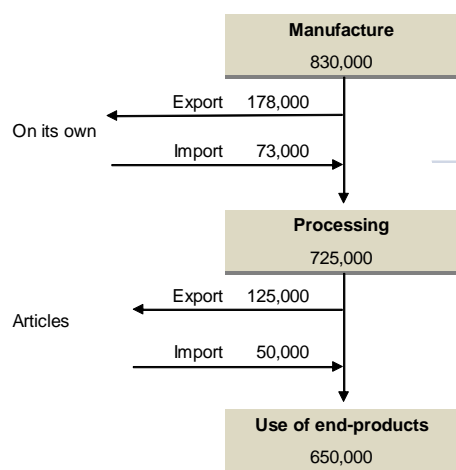


Figure 3.1 Schematic view of the approximate flow of DINP and DIDP in 2010

3.2 Manufacturing and overall consumption of DIDP and DINP

Data on sales of the two substances in the EU have been made available by the European Council of Plasticisers and Intermediates (ECPI) on behalf of the manufacturers; individual company data has not been made available by industry as the data are considered to be confidential and competition-law-sensitive due to the low number of manufacturers. In the following, the consumption of each of the two substances in the EU is roughly estimated on the basis of the available data. The purpose of the estimates is to provide an understanding of the consumption of plasticisers.

According to ECPI, the consumption of DINP, DIDP and DPHP (di-2-propylheptyl phthalate), has increased from representing about 50% of total phthalate sales in Europe in 2001 to approximately 83% of the total sales in 2010 (ECPI, 2011a).

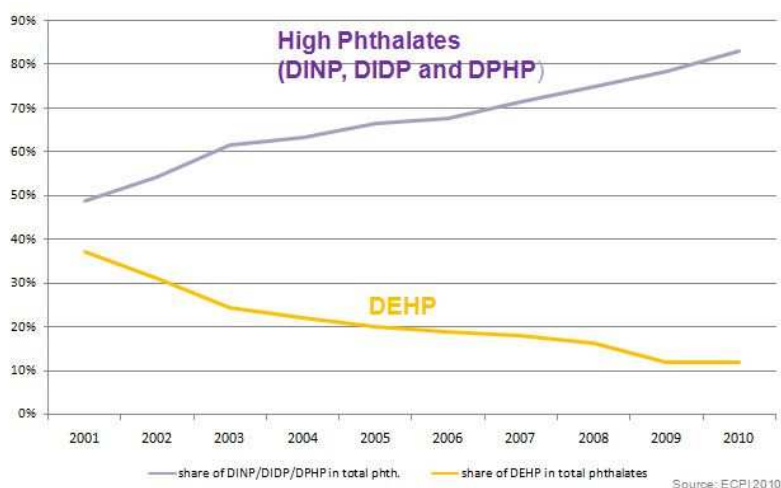


Figure 3.2 Percentage of phthalates sales in Europe compared to other plasticisers (ECPI, 2011a)

It is not specifically indicated how much of the high molecular weight phthalates referred to in the figure above is represented by DINP and DIDP. The total use of plasticisers, including phthalates, has been steady to slightly declining within the EU during the last 10 years, driven by the increasing manufacture of PVC articles outside the EU. While on a global scale producers still foresee an increase in total manufacture and consumption of plasticisers, consumption within the EU is likely to continue to be steady to slightly declining (ECPI and CEFIC as cited by ECHA 2010a).

The three phthalates DINP, DIDP and DPHP account for the majority of the C9/C10 phthalates both at global and at an EU level.

According to ECPI (2011a), in Europe, about one million tonnes of phthalates are manufactured each year, of which approximately 93% are used to make polyvinyl chloride (PVC) soft and flexible (ECPI, 2011c). The total manufacture of plasticisers is not indicated, but ECPI (2011b) indicates that the total consumption of plasticisers in Western Europe is approximately about one million tonnes. It is indicated by Calvin (2010) (see Table 6.1) that non-phthalate plasticisers accounted for approximately 16% of the plasticiser market in Western Europe in 2010, and on this basis the consumption of phthalates would be approximately 840,000 tonnes. The difference between manufacturing and consumption is quite well in accordance with the data on external trade indicating a net export of C8 (mainly DEHP) and C9/C10 phthalates of approximately 230,000 t/year (see Table 3.1 in the next section).

If 83% of the manufacturing of phthalates (as is the case for consumption) is C9/C10 phthalates, the total manufacture of these phthalates corresponds to approximately 830,000 t/year.

As far as DIDP is concerned, the current EU consumption for DIDP has been reported to be approximately the same as was reported in the EU RAR (Risk Assessment Report) for this substance for the year 1994 (CEFIC as cited by ECHA, 2010 b). The EU RAR indicates the consumption in Western Europe in 1994 to be in the range of 193,000- 220,000 t/year and applies a mean value of 200,000 t/year. The export of DIDP on its own was 38,000 t/year and the substance was not reported as being imported on its own. Consequently, the manufacturing in Western Europe in 1994 was in the range of 235,000-258,000 t/year.

If the manufacturing in 2010 was at the same level (approximately 250,000 t) then it would represent approximately 30% of total manufacturing of C9/C10, and the manufacture of the DINP and DPHP would be approximately 580,000 tonnes.

According to a presentation by Bisig (BASF) at SPI Vinyl Products Division 20th Annual Vinyl Compounding Conference (2009), in 2008 DINP represented 32 % of the of the total plasticiser market in Western Europe while DPHP/DIDP represented 23%. According to these data, the two groups of phthalates consequently represented 55% of the phthalate consumption in Western Europe. This is somewhat lower than indicated by ECPI (2011a) which indicate that the C9/C10 phthalates in 2008 accounted for approximately 75% of the phthalate market (Figure 3.2).

The table by Bisig (2009) shows that linear phthalates for 2009 represented some 10% of the total use of plasticisers. According to information provided by ECPI for the current report, more than 40% of these linear plasticizers have been replaced in last three years by DIDP, DINP, DPHP for cost/performance reasons and lack of availability (ECPI, 2011d).

The data presented by Bisig (2009) does not seem to be fully in accordance with the information that the manufacturing of DIDP is at the same level as in 1994, but as the main objective here is to provide estimates of consumption, no attempt has been made to split the manufacturing data on the three phthalates.

The available data on manufacture and consumption use the terms “Western Europe” and “Europe” and it is not always clear to what extent these data are representative of to the EU.

Based on above data the consumption of the C9/C10 phthalates (DINP, DIDP, DPHP) in the EU in 2010 is estimated to be approximately 670,000 tonnes. ECPI has confirmed this estimate. The split between the different phthalates and application areas is discussed further in Section 4 of this report.

3.3 Import and export of the substances on their own

Data on extra-EU27 import and export of dioctyl orthophthalates and dinonyl and didecyl orthophthalates on their own retrieved from Eurostat are shown in Table 3.1. The trade statistics include separate CN8 (Combined Nomenclature) codes for esters of othophthalic acid for dibutyl, dioctyl, and dinonyl/didecyl. Other esters of othophthalic acid are registered under a separate CN8 code.

The dinonyl orthophthalates (C9) include DINP and this substance accounts for the main part of the C9 phthalates. Other phthalates that might be included under this CN8 code is 911P (linear nine-eleven phthalate, slightly branched), 79P (linear seven-nine phthalate (highly branched)). Examples of the phthalates are from ECPI (2011a).

The didecyl orthophthalates (C10) include DIDP and this substance accounts for a major part of the C10 phthalates. Other phthalates that might be included under this CN8 code are DPHP, 1012P (linear ten-twelve phthalate) and 610P (linear six-ten phthalate).

The dioctyl orthophthalates include DEHP and DIOP (diisooctyl phthalate), but DEHP accounts for the majority of this category.

In the absence of more specific information on the trade of the two phthalates, the data for dinonyl and didecyl orthophthalates are taken as representing DINP and DIDP respectively in terms of import and export.

The net export of DINP/DIDP in 2010 was approximately 160,000 t/year (based on data for CN8 29.17.33.00) . Import of the substances accounted for approximately 3% of the total consumption of the substances in the EU.

Table 3.1 Extra-EU27 import and export of dioctyl, dinonyl and didecyl orthophthalates in 2008-2010 (t/y)

CN8 code	Name	2008		2009		2010	
		Import	Export	Import	Export	Import	Export
29.17.32.00	Dioctyl orthophthalates	10,436	39,570	2,426	41,017	4,327	73,435
29.17.33.00	Dinonyl and didecyl orthophthalates	27,394	142,898	22,425	166,385	18,707	177,509

Source: Eurostat database "DS-016890 - EU27 Trade Since 1988 By CN8"

4 Consumption of DINP and DIDP by use category

Due to confidentiality, and competition law sensitivities, ECPI has provided consolidated data on the uses of DINP and DIDP. Data on the specific use of DINP and DIDP by manufacturer has not been made available.

The EU risk assessment reports (RARs) for DINP, DIDP and DEHP applied the same breakdown by application area for the three substances and estimated the consumption for each application area by multiplying the percentage of the total phthalates consumption for the area by the total consumption figures for each of the phthalates.

However, as a consequence of the different properties of DINP and DIDP, some differences in the use by application area are seen as discussed below.

About 95% of DINP is used in PVC applications. The other 5% is used in non-PVC applications such as rubbers, adhesives, sealants, paints and lacquers and lubricants (ECPI, 2011b). For DIDP, non-PVC applications are reportedly relatively small, but include use in anti-corrosion and anti-fouling paints, sealing compounds and textile inks (ECPI, 2011b).

According to TURI (2006), the price of DIDP (in the USA) is about 5% higher than the price of DINP. If the same is true in Europe it would be expected that DIDP is mainly used in applications where the substance has some technical advantages compared to DINP. For applications where either could be applied (as is often the case) it would be expected that the least expensive of the substances would be used.

The low vapour pressure of DIDP and its higher permanency makes it the preferred plasticizer for applications such as wire and cable formulations where heat aging resistance is required and in areas where emissions of volatile components into the atmosphere during processing is subject to restriction or where good outdoor weathering resistance is required (BASF, 2011; ExxonMobil, 2011). Furthermore, DIDP has good resistance to extraction by soapy water (BASF, 2011).

In accordance with this, ECPI (2011b) indicates that, due to DIDP's properties of volatility resistance, heat stability and electric insulation, it is typically used as a plasticiser for heat-resistant electrical cords, leather for car interiors, and PVC flooring. DIDP is preferentially used in car interior trims meeting the low fogging thresholds set by car manufacturers, which are usually not met by using DINP or low molecular weight phthalates (ECPI as cited by ECHA, 2010b). Høiby *et al.* (2011) reports that, according to a major manufacturer of cables and wires, DIDP represents 80% of the phthalates used for this application area. Besides the uses in cables, Industry indicates that DIDP is preferably used in extruded and calendered articles (such as profiles, roofing sheets, ponds liners, etc.); however, similarly to DINP, DIDP can also be blended into a paste (so-called "plastisol") for coating (such as tarpaulins, synthetic leather, flooring, wall covering, etc.) (ECPI as cited by ECHA, 2010b).

According to ECPI, DINP can be blended into a paste (so-called "plastisol"), which makes it particularly fitted for coating (such as tarpaulins, synthetic leather, flooring, wall covering, etc.) and rotational moulding (such as some toys and sporting articles) applications (ECPI as cited by ECHA, 2010a)

DPHP is often used as an alternative to DIDP because only minor compound changes are needed to adapt for example wire formulations to DPHP (ECPI, 2011b). It similarly matches DIDP performance in automotive applications. Due to its low volatility, DPHP is suitable for higher temperature applications such as wire and cable and automotive interior trim. Its weather resistance

makes it a strong candidate for outdoor applications. DPHP boasts better UV stability than most general purpose plasticisers, making it especially suitable for applications like roofing, geomembranes, or tarpaulins.

The total consumption of phthalates by PVC applications area in 1994 is shown in the table below.

Table 4.1 PVC end-use breakdown for all phthalates in 1994 (based on ECB, 2003a)

Process	Application area	Percentage of total phthalate use for PVC in 1994
Calendering	Film, sheet and coated products	15.7
	Flooring, roofing, wall covering	3.5
Extrusion	Hose and profile	5.3
	Wire and cable	28.7
	Clear, medical, film	7.1
Injection moulding	Footwear and miscellaneous	8.3
Plastisol spread coating	Flooring	10.5
	General (coated fabric, wall covering, etc.)	11.4
Other plastisol applications	Car undercoating and sealants	7.6
	Slush/rotational moulding etc.	1.9

ECPI (2011a) provides an overview on its website of the current use of plasticisers in both PVC and non-PVC applications (Table 4.2). In this breakdown the uses are divided into slightly different groups than used for the 1994 breakdown, but the overall breakdown is not significantly different from the breakdown provided for 1994. For one of the groups included in both breakdowns - wire and cable - the percentage has decreased from 28.7% to 25%, but this difference is considered to be within typical levels of uncertainty for such data.

Table 4.2 Current uses of plasticisers in Europe (ECPI, 2011a)

Application are	Percent of total consumption
Wire and cable	25
Extrusions	11
Film and sheet	22
Floor covering	14
Coated fabric	10
Plastisols	9
Other	9
Total	100

ECHA has requested a scenario for the use of the substances in 2015. In order to prepare a 2015 scenario for the use of DINP and DIDP in the EU, the total estimated consumption of the two phthalates has been roughly distributed across the different application areas.

Based on data presented in section 3, the consumption of the C9/C10 phthalates (DINP, DIDP and DPHP) in the EU in 2010 is estimated at approximately 670,000 tonnes. DINP and DIDP are assumed to represent the majority, with DPHP accounting for a minor part. If the market trend from the last decade continues over the coming years, the C9/C10 phthalates would represent 100% of the phthalate consumption by 2015 regardless of further restriction of DEHP, DBP and BBP. It is however more likely that the trend lines would level off and DEHP would still be used for some applications. The trend will also depend on possible further restrictions on DEHP, DBP and BBP as

recently proposed by Denmark (ECHA, 2011) and on the extent to which authorisations for the use of DEHP are approved. For the year 2015 the consumption of DINP, DIDP and DPHP is assumed to be at some 850,000 tonnes of which 95% is assumed to be used for manufacture of PVC. It will be assumed that the ratio of DINP to DIDP/DPHP is 32:23 (as indicated above for the use in Western Europe in 2010). No data on DPHP consumption are available, but it will here be roughly assumed that DIDP in 2015 would account for 2/3 of the total DIDP/DPHP consumption.

The breakdown of different application areas for the two compounds has been roughly estimated considering the available information on the differences in applications of the substances (Table 4.3). In practice, a new breakdown has been established for DIDP with relatively high percentages for cables and calendaring applications. The breakdown for DINP has subsequently been adjusted on the basis of the breakdown for DIDP+DINP and the assumed breakdown for DIDP.

The breakdowns are considered to be “best estimate scenarios” for modelling purposes, but it is not possible to judge how well the estimates reflect the actual situation in Europe.

If the data are combined with the data on import and export of the substances in articles in Table 6.2 (indicating an export of 105,000 tonnes per year in 2008-2010) it is it can be estimated that export of the substances in articles accounts for 10-20% of the production in the EU.

Table 4.3 Scenario for the breakdown of the use of DINP and DIDP by application area in 2015

Process	Application area	DINP +DIDP		DINP		DIDP	
		Percentage of total	Consumption, tonnes	Percentage of total	Consumption, tonnes	Percentage e of total	Consumption, tonnes
Calendering	Film, sheet and coated products	14.9	109,178	11.5	57,018	22.0	52,140
	Flooring, roofing, wall covering	3.3	24,339	1.6	7,739	7.0	16,590
Extrusion	Hose and profile	5.0	36,856	5.1	25,006	5.0	11,850
	Wire and cable	27.3	199,580	17.3	85,761	48.0	113,760
	Clear, medical, film	6.7	49,373	8.1	39,901	4.0	9,480
Injection moulding	Footwear and miscellaneous	7.9	57,718	9.7	48,249	4.0	9,480
Plastisol spread coating	Flooring	10.0	73,017	13.8	68,299	2.0	4,740
	General (coated fabric, wall covering, etc.)	10.8	79,276	15.5	76,933	1.0	2,370
Other plastisol applications	Car undercoating and sealants	7.2	52,850	10.2	50,498	1.0	2,370
	Slush/rotational moulding etc.	1.8	13,213	2.2	10,845	1.0	2,370
Mixture formulation	Non-PVC applications	5.0	36,600	5.0	24,750	5.0	11,850
Total		100.0	732,000	100	495,000	100	237,000

Note: The values above have been calculated without rounding. The fact that the figures are calculated to the nearest tonne does not mean that they should be interpreted as precise to the nearest tonne.

5 Concentration of DINP and DIDP in articles

ECPI has provided information on concentration of DINP and DIDP in articles on behalf of the manufacturers of DINP and DIDP (ECPI, 2011d). Data on the content of the two substances in PVC materials has also been collected from the available literature.

According to information from ECPI, the typical content of DIDP in flexible PVC products is between 25 and 50% (w/w) (ECPI, 2011b).

The EU risk assessment for DINP does not indicate the typical content of DINP in flexible PVC. The substance is typically used as a 1:1 substitute for DEHP. According to the EU Risk Assessment for DEHP, the typical concentration of DEHP varies, but is often around 30% (w/w).

RPA (2000) indicates that in a typical flexible PVC the plasticiser is used at 60 phr (60 parts plasticiser to 100 parts PVC resin) resulting in a typical concentration of approximately 30% in the final flexible PVC material as fillers (mainly CaCO₃) and other additives are typically used at a total of 40 phr. ECPI has for the current report confirmed that these estimates are correct (ECPI, 2011d).

The available data on the use of PVC resin and plasticisers for flexible PVC in Europe indicates that the average plasticiser consumption equates to below 30%. According to ECVN, the total PVC resin consumption in Western Europe, Czech Republic, Hungary, Poland and Slovakia in 2007 was 6.5 million tonnes (ECVM, 2011). Based on the breakdown on applications it can be estimated that flexible PVC takes up about 35% of the total PVC resin consumption corresponding to about 2.3 million tonnes PVC resin. If 930,000 tonnes plasticisers (93% of 1 million tonnes in Western Europe) are used to plasticise 2.3 million tonnes PVC resin the average quantity of plasticiser is rather 40 tonnes per hundred tonnes PVC than the 60 tonnes per hundred tonnes PVC (phr) mentioned above in relation to estimates of actual plasticised PVC products.

Turi (2006) provides the following typical formulations for cable sheathing in the USA: PVC resin (100 parts per hundred resin (phr)), DIDP (55-60 phr), CaCO₃ (50 phr), stearic acid (0.25 phr), calcium/zinc stabiliser (4-5 phr) and epoxidised soybean oil (0-5 phr). This corresponds to a DIDP concentration of the final PVC material of approximately 27% (w/w).

Actual analyses of plasticisers in different products demonstrate that, for the same product, often different combinations of plasticisers are found. The combination of plasticisers in a PVC material is partly governed by the desired performance characteristics of the plasticised material and partly by the desired process parameters for the manufacturing of the PVC materials. Several plasticisers can be used when a “specialty” plasticiser is used to impart a special property, e.g. cold flexibility or fast fusing (ECPI, 2011d). As these specialty plasticisers can not easily be used on their own, a general purpose phthalate plasticiser is often added to them. General purpose plasticisers are typically used on their own. A possible explanation for the fact that small concentrations of general purpose plasticisers are reported for products where another general purpose plasticiser is used is that DINP and DIDP have some small amounts of overlapping isomers (phthalate homologues) (ECPI, 2011d).

The background data report for a recent Annex XV restriction dossier for DEHP, BBP, DBP and DIBP provides the following data specifically on the use of DINP and DIDP as collected from manufacturers of different articles (Højbye *et al.*, 2011). This is supplemented by information provided by ECPI for the current study to allow the following conclusions to be made:

- DINP is the major plasticiser for plastisol applications, in particular for the production of flooring products. Plasticiser concentrations vary quite extensively depending on flooring

type. 10-20% plasticiser content, depending on product type, has been reported for products for the professional market, while higher concentrations (25-30%) are reported for low-price cushioned PVC flooring for the private market. It is not specifically indicated whether the lower plasticiser content in the products for the professional market is correlated with a lower flexible PVC content of the flooring.

- German investigations performed in 2003 (Stiftung Warentest, 2003 as cited by Høiby *et al.*, 2011) revealed a rather complex picture regarding plasticiser usage in flooring. PVC flooring marketed in Germany contained one or more of the following phthalates: DIBP, DBP, BBP, DEHP, DINP, DIDP, DIHP and DIOP. DINP and DIDP were found in significant concentrations. A total of 25 different products were analysed. The total concentration of phthalates registered in the products was in the range of 6.3% to 36.5%. According to ECPI, vinyl floors produced nowadays are based on DINP as the general purpose plasticizer and use a secondary fast fusing plasticizer, often esters of benzoic acid. DEHP, DIBP, DBP, DIHP and BBP have been phased out by European flooring manufacturers in the last 3 to 5 years. They may still be detected in vinyl floorings including a high level of recycled content or in some flooring produced outside the EU.
- DINP is the main plasticiser used in wallpaper/wall covering. According to major producers of PVC wallpaper, typical plasticiser concentrations are 25-30%.
- One producer has reported DINP concentrations in air mattresses of 20-30%.
- Typically, swimming pool liners made of flexible PVC contain 20-30% DINP and pool covers contain 25-30 % DEHP.
- DEHP is the preferred plasticiser in bathing equipment with concentrations in the range 20-40%. Alternatively 20-30% DINP is used.
- DIDP and DEHP are likely the main plasticisers used for cables in the EU. According to one manufacturer, DIDP constitutes about 80% of the current plasticiser consumption for cables in the EU. Typical plasticiser concentrations in the PVC insulation are reported at 20-30%. (According to information provided by ECPI for this study, DINP is rarely used for cables)

An investigation by Naturskyddsföreningen i Sverige revealed that the PVC part of tested footwear bought in different countries contained up to 23.2% DEHP, up to 9.6% DBP, no BBP, up to 19.4% DNOP (CAS No 117-84-0, not commercially available), up to 3.2% DINP and up to 4.7% DIDP. (SSNC, 2009). The total content of phthalates varied between 7% and 36.2%.

Table 5.1 summarises information on DINP and DIDP based on actual surveys of different product groups. Several of the surveys have been undertaken as part of the Danish EPA's programme on consumer products. A number of other surveys of the programme published in 2010 address phthalates in different product groups, but these surveys have not included DINP and DIDP.

The Food and Consumer Product Safety Authority, part of the Dutch Ministry of Agriculture, has undertaken a number of surveys of plasticisers in toys and childcare articles in the Netherlands. The data shown in the table represent those samples where the concentration of DIDP and DINP was above 1%. Low concentrations of DIDP (typically below 1%) are indicated for many samples with concentrations of DINP in the range of 30-50%. The explanation is likely to be that DINP and DIDP have some small amounts of overlapping isomers (phthalate homologues).

In the dataset for 2009, of 258 samples the total content of DEHP, DBP, BBP, DINP, DIDP and DnOP was above 1% in 62 of the samples (FCPSA, 2010). The total content of the 6 phthalates ranged from 6% to 60% with an average of 33%.

As mentioned earlier, DINP and DIDP/DPHP are essentially used for the production of durable goods such as wire & cable, flooring, roofing and wall covering. Most of the articles listed below can only represent a small percentage of the use of general purpose phthalates and a very small percentage of the DINP, DIDP use in articles. ECPI reports that sensitive applications like toys and medical applications account for less than 4% of the global flexible PVC end-uses.

Table 5.1 Examples of actual measurement of DINP and DIDP in products

Product group	n ^{*1}	Number of samples with substance > 1% ^{*2}		DINP content % (w/w)		DIDP content % (w/w)		Year	Organisation	Source
		DINP	DIDP	Range	Average	Range	Average			
Packaging for shampoo and bath soap	10	4	n.a.	1-31	22	n.a.	n.a.	2006	Danish EPA	Poulsen and Schmidt, 2007
Erasers	26 (10) ^{*3}	3	n.a.	37-70	47	n.a.	n.a.	2006	Danish EPA	Svendson et. al. 2007
Sex toys	15	2	n.a.	>50-60	55	n.a.	n.a.	2005	Danish EPA	Nilsson <i>et al.</i> , 2006
Sex toys	71	18	8	6-77	39	10-55	27	2009	The Netherlands Food and Consumer Product Safety Authority	VWA, 2009
Toys for animals	13	10	n.a.	7-54	28	n.a.	n.a.	2005	Danish EPA	Müller <i>et al.</i> , 2006
Toys and baby articles	252	23	4	0.7-41	29	9-32	24	2007	^{*8}	Biedermann-Brem <i>et al.</i> , 2008
Toys ^{*6}	205	45	12	1-75	41	1-11	3	2008	^{*7}	FCPSA, 2009
Childcare articles ^{*6}	25	2	1	4-28	16	25	25	2008	^{*7}	- "-
Toys ^{*6}	258	36	31	1-58	28	2-38	8	2009	^{*7}	FCPSA, 2010
Childcare articles ^{*6}	13	2	0	37-56	47	-	-	2009	^{*7}	- "-
Mitten labels	2	2	n.a.	8-9	8	n.a.	n.a.	2008	Danish EPA	Tønning <i>et al.</i> , 2009
Shower mat	7	1	n.a.	14	14	n.a.	n.a.	- "-	- "-	- "-
Soap packaging	6	1	n.a.	9	9	n.a.	n.a.	- "-	- "-	- "-
Plastic shoes	27	1	1	3	3	1	1	2009	Swedish Society for Nature Conservation	SSNC, 2009
Conveyer belts	12	1	0	2.5	2.5	0	0	2008/2009	Danish Veterinary and Food Administration	DVFA, 2010
Flooring	5	2	^{*4}	5-31	18	^{*4}	^{*4}	2000	Danish EPA	Pors and Fuhlendorf, 2001
PVC gloves	4	1	^{*4}	59	59	^{*4}	^{*4}	- "-	- "-	- "-

Product group	n ^{*1}	Number of samples with substance > 1% ^{*2}		DINP content % (w/w)		DIDP content % (w/w)		Year	Organisation	Source
		DINP	DIDP	Range	Average	Range	Average			
Vinyl wallpaper	4	2	*4	23-26	25	*4	*4	- “-	- “-	- “-
Carpet tiles	2	1	*4	27	27	*4	*4	- “-	- “-	- “-
Shoulder bags, (transparent plastic, cloth like, artificial leather)	3	1	*4	11	11	*4	*4	- “-	- “-	- “-
PVC gloves	n.i	n.i	n.i	32	32			2000	*9	Sauvegrain and Guinard, 2001
Gloves	n.i.	n.i.	n.i.	41-43	42	16-17	17	n.i.	Institute for Chemical and Bioengineering	Wormuth <i>et al.</i> , 2006
Paints	n.i.	n.i.	n.i.	0.05-0.5	0.3	0.03-0.3	0.2	n.i.	- “-	- “-
Adhesives	n.i.	n.i.	n.i.	3-6 ^{*5}	4	0.5-6	2	n.i.	- “-	- “-

*1 Number of samples

*2 Number of samples with concentration above a certain level defined in the studies (typically 1 % w/w)

*3 10 out of 26 erasers were made of PVC; of these 3 contained DEHP.

*4 The data indicated for DINP is the sum of DINP and DIDP

*5 The paper indicates the min at the same magnitude as the max – here the min is adjusted on the basis of the indicated mean and max.

*6 Number of samples indicate materials with more than 0.1% of the substances.

*7 The Food and Consumer Product Safety Authority, the Dutch Ministry of Agriculture, Nature and Food Quality.

*8 Official Food Control Authority of the Canton of Zurich, Chemical and Veterinarian State Laboratory of Baden-Württemberg, Institute for Food Investigation of the State Vorarlberg, State Laboratory of Basel-City, Kantonales Amt für Lebensmittelkontrolle, St Gallen.

*9 Laboratoire National d’Essais Centre Logistique et Emballage at the request of Ansell Healthcare Europe N.V

n.a. Not analysed

n.i. Not indicated by the data source

6 DINP and DIDP in imported articles

6.1 Methodology

DINP and DIDP may be imported and exported in a large number of articles. In general it is very difficult to obtain specific information on the plasticiser content of the imported articles.

In order to obtain an indication of the magnitude of the potential import and export of the substances, the following information is combined using an approach developed by the Danish EPA for estimating import of phthalates into Denmark (Skårup and Skytte, 2003):

- Data in import and export by region of relevant commodities obtained from Eurostat
- Data on the average content of flexible PVC and plasticiser content by commodity.
- Data on the percentage of the total plasticiser use for PVC accounted for by DINP/DIDP by region.

Data on export and import of relevant product groups were retrieved for the period 2008 to 2010 from Eurostat database “DS-016890 - EU27 Trade Since 1988 By CN8”. The basic data for each commodity group is shown in Annex 1, which also include a further description of the data processing.

The product groups were selected on the basis of the study by Skårup and Skytte (2003). The study estimated the total phthalates content of products produced, imported to and exported from Denmark, and compared the estimated phthalates content with import data obtained from the taxation authorities on the basis of the yield of the Danish tax on PVC and phthalates (note that production statistics in Denmark apply the same combined nomenclature as the import/export statistics and not the Prodcom nomenclature). The product groups in the study by Skårup and Skytte (2003) were selected on the basis of a number of previous studies on the use of phthalates in Denmark, among these a substance flow analysis from 1995. For products with tax (representing approximately 50% of the phthalate consumption) the total phthalate consumption estimated on the basis of the import/export statistics, was about 30% higher than the phthalate consumption based on the yield of the tax.

The methodology has more recently been evaluated by Brandt and Hansen (2009). For the product groups covered by the Danish tax system, they compared the supply of phthalates estimated on the basis of this methodology with the estimated consumption of phthalates based on the tax proceeds. For the flooring, the two estimation methods gave quite different estimates, whereas for other product groups the estimations based on import/export and production statistics seems to provide a quite good estimate. The original methodology estimated that products under CN8 39.18.10.90 was 100% PVC, what it certainly is not. The percentage PVC of the products is here estimated to be rather 50% on average.

Furthermore, the background data report for the Annex XV restriction report for the phthalates DEHP, BBP, DBP and DIBP provides some updated data on the use of phthalates in different product groups, which have been considered in the evaluation of the methodology (Høiby *et al.*, 2011).

6.2 Plasticiser use by region

According to the European Council for Plasticisers and Intermediates (ECPI), in Western Europe about one million tonnes of phthalates are produced each year. Approximately 900,000 tonnes of the plasticisers are used to plasticise PVC (ECPI 2011a).

DINP, DIDP and DPHP currently represent ca. 65% of the overall consumption of plasticisers in Western Europe (ECHA, 2010a) corresponding to about 650,000 tonnes. No data on the consumption of each of the substances are available as this information is considered confidential and is sensitive under EU competition law, due to the low number of manufacturers of the substances.

About 95% of DINP is used in PVC applications (ECHA, 2010a) and the same is expected to be the situation for DIDP. As concerns the use in articles, PVC account for more than 95% of the consumption of the substances and, as limited information is available on the use in other polymers, this assessment focuses on the use in PVC.

The most recent available estimate of the use of plasticisers by region, presented at the 22nd Annual Vinyl Compounding Conference in July 2001, concern 2010 (Calvin, 2011). The breakdown of the plasticiser market in Western Europe, USA and Asia is shown in Table 6.1. According to this presentation, DINP/DIDP represented 63% of the plasticiser market in Western Europe in 2010, whereas it only represented 33% of the market in the USA and 21% of the market in Asia. The total global market for plasticisers was estimated at 6 million tonnes, with 1.4 million tonnes in Europe, the Middle East and Africa, 1.1 million tonnes in the Americas and 3.5 million tonnes in Asia (Calvin, 2011). Of the global plasticiser market, phthalates represented 84% (Calvin, 2011).

If the percentages of total plasticiser market shown for the USA are used as a best estimate for the Americas and the percentages for Western Europe are used as best estimates for Europe, the Middle East and Africa, then DIDP and DINP (and other C9/C10 phthalates) should represent about 32% of the global plasticiser market and Asia should represent 39% of the global consumption of the substances. It has been reported that DINP/DIDP represent approximately 30% of the total global consumption of plasticisers (ECHA, 2010a) and it is likely that, for countries in the region Europe, the Middle East and Africa outside Western Europe, DINP/DIDP represent a lower percentage than in Western Europe.

Table 6.1 World plasticiser market 2010 (Calvin, 2011)

Plasticiser	Percentage of total plasticiser market *1		
	Western Europe	USA	Asia
DEHP	16	19	60
C9/C10 phthalates *2	63	33	21
Linears/other phthalates *3	6	19	9
Non phthalates	16	38	10
Total	100	100	100

*1 The data are indicated to be based on two market reports (SRI,CMAI) and BASF estimates.

*2 Note of the authors of this report: Mainly DINP (C9) and DIDP (C10).

*3 Note of the authors of this report: "linears" are linear phthalates such as 911P 9-10-11 linear phthalate.

Another presentation of the world plasticiser market in 2008 indicates that DPHP/DIDP represented less than 1% of the plasticiser market in Asia, while DINP represented 18% of this market area. For Western Europe and the USA the consumption of DINP is approximately 25% higher than the DPHP/DIDP consumption (Bisig, 2009).

For the estimate of import/export of DINP/DIDP in articles it will be assumed that DINP/DIDP account for the following percentages of the total plasticiser consumption by region:

- EU, Switzerland, Norway, Iceland: 63%
- The Americas: 33%
- Asia and rest of the world: 21%

6.3 Result

The estimated amount of plasticised PVC in each commodity group and the plasticiser content of the PVC part of the product are shown in the table in Annex 1. For some of the product groups such as floor coverings coated with PVC or electric conductors the estimated plasticiser content is considered to be relatively certain, whereas for more heterogeneous product groups the estimated content of plasticised PVC is considered to be very uncertain.

The import of the DINP/DIDP in articles within each commodity group (CN8 group), $Import_{DINP/DIDP,CN8}$ is calculated using the following equation:

$$Import_{DINP/DIDP,CN8} = \sum_{reg=1}^4 Import_{CN8,reg} * Flex PVC_{CN8} * Plasticiser_{PVC,CN8} * DINP/DIDP_{plasti,reg}$$

where:

$Import_{CN8,reg}$ is the import in tonnes of the commodity group from the region (e.g. Asia)

$Flex PVC_{CN8}$ is the percentage flexible PVC of the total volume of the commodity (same for all regions)

$Plasticiser_{PVC,CN8}$ is the percentage plasticiser of the flexible PVC in the commodity (same for all regions)

$DINP/DIDP_{plasti,reg}$ is the percentage DINP/DIDP of the plasticisers used in the region (same for all commodities)

The products are grouped in Table 6.2 into the product groups used for this assessment. The total plasticiser content of exported products is, based on the assumptions outlined in the Annex, estimated at about 170,000 tonnes which seems to be quite realistic considering that the total tonnage for manufacturing of products in the EU is 1,000,000 tonnes. Assuming DINP/DIDP accounts for the percentages indicated above of the total plasticiser content, the import and export is estimated at 45,000 tonnes and 105,000 tonnes respectively, and the export corresponds to about 15% of the total use for manufacturing of products in the EU.

Of the import into the EU, 51% of the tonnage of the articles originates from China, whereas only 9% of the imported DINP/DIDP is estimated to originate from China.

It should be noted that some import/export may take place with articles not covered by the assessment e.g. vehicles and electrical and electronic equipment, and the total tonnage imported in these articles are considered to add some 10-30% to the totals as the major application areas are covered by the statistics.

As a best estimate, adding 20% to the figures in Table 6.2, the import can be estimated at approximately 50,000 tonnes and the export at 125,000 tonnes.

Table 6.2 Estimated DINP/DIDP content of EU27-extra traded articles. Average of the years 2008-2010

Product group	Tonnage products t/y		Tonnage plasticiser t/y		Tonnage DINP/DIDP t/y	
	Import	Export	Import	Export	Import	Export
Hoses and profiles	21,572	38,727	3,515	7,501	1,263	4,437
Flooring and wall covering	127,187	231,592	10,569	29,830	2,396	18,993
Film/sheets and coated products	1,164,779	922,288	75,201	68,578	21,505	42,706
Coated fabric and other products from plastisol	283,151	695,235	3,426	5,986	927	3,749
Wires and cables	117,036	153,675	8,183	9,695	2,336	5,780
Moulded products and other	449,756	475,303	63,448	47,006	15,058	29,364
Total	2,163,482	2,516,820	164,342	168,597	43,485	105,029

7 References

Babich MA, Osterhout A (2010). Toxicity review of diisononyl phthalates (DINP). U.S. Consumer Product Safety Commission. <http://www.cpsc.gov/about/cpsia/toxicityDINP.pdf>

BASF (2011). Palatinol® DIDP Diisodecyl Phthalate. Technical data sheet. Accessed October 5, 2011 at: <http://www2.basf.us/businesses/chemicals/plasticizers/pdfs/pal-didp.pdf>

Biedermann-Brem S, Biedermann M, Pfenninger S, Bauer M, Altkofer W, Rieger K, Hauri U, Droz C, Grob K. (2008). Plasticizers in PVC toys and childcare products: What succeeds the phthalates? Market survey 2007. *Chromatographia*. 68: 227-234.

Bisig, M.D. (2009). Plasticizer Market Update. SPI Vinyl Products Division 20th Annual Vinyl Compounding Conference, July 19-21, 2009. Presented by Michael D. Bisig, BASF Corporation. Accessed October 2011 at: http://www.plasticsindustry.org/files/about/VPD/A_Bisig_BASF.pdf

Brandt UK, Hansen E. (2009). Ftalater i afgiftsbelagte produkter [Danish: Phthalates in products subject to tax]. Environmental Project No. 1290 2009. Danish Environmental Protection Agency, Copenhagen.

Calvin, E. (2011). Plasticizer Market Update. BASF Corporation. Presentation at the 22nd Annual Vinyl Compounding Conference, Burlington, July 10-13, 2011. Accessed September 3, 2011 at: <http://spi.files.cmsplus.com/about/VPD/Tuesday%201.%20Calvin%20Emmanual-%20BASF%20%3D%20Global%20Plasticizer%20Update.pdf>

DVFA. (2010). Phthalater i fødevarekontaktmaterialer, Projekt J. nr.: 2010-20-64-00230 2010. Danish Veterinary and Food Administration, Copenhagen. [in Danish]

ECB (2003a). 1,2-benzenedicarboxylic acid, di-C9-11- branched alkyl esters, C10-rich and di-“isodecyl” phthalate (DIDP). European Union Risk Assessment Report. Volume 36. European Chemicals Bureau. Office for Official Publications of the European Communities, Luxembourg.

ECB (2003b). 1,2-benzenedicarboxylic acid, di-C8-10- branched alkyl esters, C9-rich and di-“isononyl” phthalate (DINP). European Union Risk Assessment Report. Volume 35. European Chemicals Bureau. Office for Official Publications of the European Communities, Luxembourg.

ECHA (2010a). Review of new available information for di-‘isononyl’ phthalate (DINP). Review Report, July 2010.

ECHA (2010b). Review of new available information for di-‘isodecyl’ phthalate (DIDP). Review Report, July 2010.

ECHA (2011). Restrictions under consideration. Accessed October 2011 at: http://echa.europa.eu/reach/restriction/restrictions_under_consideration_en.asp

ECPI (2011a). Plasticisers. The European Council for Plasticisers and Intermediates (ECPI). Accessed 19 September 2011 at: <http://www.plasticisers.org/plasticisers>

ECPI (2011b). DIDP Information Centre, DINP Information Centre and DPHP Information Centre. The European Council for Plasticisers and Intermediates (ECPI). Accessed 19 September 2011 at: <http://www.didp-facts.com/> , <http://www.dinp-facts.com/> and <http://www.dphp-facts.com/>

ECPI (2011c). Plasticisers. The European Council for Plasticisers and Intermediates (ECPI). Accessed 19 September 2011 at: <http://www.ecpi.org/default.aspx?page=5>

ECPI (2011d). Personal communication with Maggie Saykali, the European Council for Plasticisers and Intermediates (ECPI), November 2011.

ECVM (2011). How is PVC used? Accessed 19 September 2011 at <http://www.pvc.org/en/p/how-is-pvc-used>

ExxonMobil (2011). Submission to CSPC titled CHAP on Phthalates dated March 29, 2011

FCPSA (2009). Toepassing weekmakers in speelgoed- en kinderverzorgingartikelen. Food and Consumer Product Safety Authority, the Dutch Ministry of Agriculture, Nature and Food Quality. October 2009 [In Dutch]

FCPSA (2010). Toepassing weekmakers in speelgoed- en kinderverzorgingartikelen 2009. The Food and Consumer Product Safety Authority, the Dutch Ministry of Agriculture, Nature and Food Quality. March 2010 [In Dutch] Accessed at: dienstlandelijkgebied.nl.

Højbye L, Maag J, Hansen E (2011). Background data for Annex XV dossier - DEHP, BBP, DBP and DIBP. Environmental Project No. 1362. Danish Environmental protection Agency, Copenhagen.

Müller AK, Nielsen E, Ladefoged O, Dalgaard M, Hass U. (2006). Evaluation of the health risk to animals playing with phthalate containing toys. Survey of Chemical Substances in Consumer Products, No. 74. Danish Environmental Protection Agency, Copenhagen.

Nilsson NH, Malmgren-Hansen B, Bernth N, Pedersen E and Pommer K (2006). Survey and health assessment of chemicals substances in sex toys. Survey of Chemical Substances in Consumer Products, No. 77. Danish Environmental Protection Agency, Copenhagen.

Pors J, Fuhlendorf R. (2001). Phthalates and organic tin compounds in PVC products. Survey of Chemical Substances in Consumer Products, No. 1. Danish Environmental Protection Agency, Copenhagen.

Poulsen PB, Schmidt A. (2007). A survey and health assessment of cosmetic products for children. Survey of Chemical Substances in Consumer Products, No. 88. Danish Environmental Protection Agency, Copenhagen.

RPA. (2000). The availability of substitutes for soft PVC containing phthalates in certain toys and childcare articles. RPA for the European Commission.

Sauvegrain P, Guinard I (2001). Physico-chemical contamination of foodstuffs by food handlers wearing disposable vinyl gloves. Prepared by Laboratoire National d'Essais Centre Logistique et Emballage at the request of Ansell Healthcare Europe N.V.

Skårup S, Skytte L (2003): Forbruget af PVC og phthalater i Danmark år 2000 og 2001. [Consumption of PVC and Phthalates in Denmark in year 2000 and 2001]. Kortlægning af Kemiske Stoffer i Forbrugerprodukter nr. 35. Danish EPA, Copenhagen [In Danish]

SSNC (2009). Chemicals – up close. Plastic shoes from all over the world. Swedish Society for Nature Conservation. Accessed September, 3 at: http://www.naturskyddsforeningen.se/upload/Foreningsdokument/Rapporter/engelska/chemicals_in_plastic_shoes.pdf

Svendsen N, Bjarnov E, Poulsen PB (2007). Survey as well as health assessment of chemical substances in school bags, toy bags, pencil cases and erasers. Survey of Chemical Substances in Consumer Products, No. 84. Danish Environmental Protection Agency, Copenhagen.

Tønning K, Jacobsen E, Pedersen E, Strange M, Poulsen PM, Møller L, Boyd PB. (2009) Survey and health assessment of the exposure of 2 year-olds to chemical substances in consumer products. Survey of Chemical Substances in Consumer Products, No. 102. Danish Environmental Protection Agency, Copenhagen.

TURI (2006). Five chemicals study. Toxics Use Reduction Institute (TURI), University of Massachusetts Lowell, for the Commonwealth of Massachusetts. Chapter on alternatives to DEHP available at:
http://www.turi.org/library/turi_publications/five_chemicals_study/final_report/chapter_7_dehp#7.3

VWA (2009). Consumentenproducten in de eroticabranche. Voedsel en Waren Autoriteit

Wormuth M, Scheringer M, Vollenweider M, Hungerbühler K. (2006). What are the sources of exposure to eight frequently used phthalic acid esters in Europeans? *Risk Analysis*. 26:803-824.

Annex 1 Statistical data on import/export

The data below are average values for 2008-2010. Data were retrieved from Eurostat's online Comext database. All figures are in tonnes/year.

CN8 code	Description	EU27,intra	EU27,extra	Asia	Americas	Switzerland, Norway, Iceland	Rest of the world
39042200	PLASTICISED POLY"VINYL CHLORIDE", IN PRIMARY FORMS, MIXED WITH OTHER SUBSTANCES	279,451	18,014	1,843	7,227	8,146	798
39043000	VINYL CHLORIDE-VINYL ACETATE COPOLYMERS, IN PRIMARY FORMS	82,237	2,800	1,263	1,495	2	40
39044000	VINYL CHLORIDE COPOLYMERS, IN PRIMARY FORMS (EXCL. VINYL CHLORIDE-VINYL ACETATE COPOLYMERS)	43,527	2,641	1,054	1,571	9	8
39153000	WASTE, PARINGS AND SCRAP, OF POLYMERS OF VINYL CHLORIDE	75,469	8,564	347	305	6,763	1,149
39159019	WASTE, PARINGS AND SCRAP, OF ADDITION POLYMERIZATION PRODUCTS (EXCL. THAT OF ACRYLIC POLYMERS, POLYMERS OF ETHYLENE, STYRENE AND VINYL CHLORIDE AND PROPYLENE)	-	-	-	-	-	-
39162010	MONOFILAMENT WITH ANY CROSS-SECTIONAL DIMENSION OF > 1 MM, RODS, STICKS AND PROFILE SHAPES, WHETHER OR NOT SURFACE-WORKED BUT NOT FURTHER WORKED, OF POLY"VINYL CHLORIDE"	334,018	21,298	19,344	382	358	1,219
39162090	MONOFILAMENT WITH ANY CROSS-SECTIONAL DIMENSION OF > 1 MM, RODS, STICKS AND PROFILE SHAPES, WHETHER OR NOT SURFACE-WORKED BUT NOT FURTHER WORKED, OF POLYMERS OF VINYL CHLORIDE (EXCL. POLY"VINYLCHLORIDE")	12,535	3,847	3,579	40	199	29
Tubes and hoses							
39173235	FLEXIBLE TUBES, PIPES AND HOSES, OF POLYMERS OF VINYL CHLORIDE, NOT REINFORCED OR OTHERWISE COMBINED WITH OTHER MATERIALS, SEAMLESS AND OF A LENGTH > THE MAXIMUM CROSS-SECTIONAL DIMENSION, WHETHER OR NOT SURFACE-	30,927	1,861	1,149	626	36	51

CN8 code	Description	EU27,intra	EU27,extra	Asia	Americas	Switzerland, Norway, Iceland	Rest of the world
	WORKED, BUT NOT OTHERWISE WORKED						
39173299	FLEXIBLE TUBES, PIPES AND HOSES OF PLASTICS, NOT REINFORCED OR OTHERWISE COMBINED WITH OTHER MATERIALS, WITHOUT FITTINGS (EXCL. SEAMLESS AND CUT TO LENGTH ONLY AND ARTIFICIAL GUTS)	14,017	5,433	2,053	975	2,304	100
39173310	FLEXIBLE TUBES, PIPES AND HOSES, OF PLASTICS, NOT REINFORCED OR OTHERWISE COMBINED WITH OTHER MATERIALS, WITH FITTINGS ATTACHED, FOR THE PIPING OF GASES OR LIQUIDS, FOR CIVIL AIRCRAFT	-	-	-	-	-	-
39173990	FLEXIBLE TUBES, PIPES AND HOSES, OF PLASTICS, REINFORCED OR OTHERWISE COMBINED WITH OTHER MATERIALS (EXCL. SEAMLESS OR CUT TO LENGTH ONLY; TUBES WITH A BURST PRESSURE OF $\geq 27,6$ MPA)	52,785	14,279	8,223	643	5,142	262
39173999	FLEXIBLE TUBES, PIPES AND HOSES, AND FITTINGS THEREFOR, OF PLASTICS, REINFORCED OR OTHERWISE COMBINED WITH OTHER MATERIALS (EXCL. SEAMLESS OR CUT TO LENGTH ONLY; TUBES WITH A BURST PRESSURE OF $\geq 27,6$ MPA; TUBES FOR THE PIPING OF GASES OR LIQUIDS, WITH FITTINGS ATTACHED, FOR CIVIL AIRCRAFT)	-	-	-	-	-	-

CN8 code	Description	EU27,intra	EU27,extra	Asia	Americas	Switzerland, Norway, Iceland	Rest of the world
Flooring							
39181010	FLOOR COVERINGS, WHETHER OR NOT SELF-ADHESIVE, IN ROLLS OR IN THE FORM OF TILES, AND WALL OR CEILING COVERINGS "IN ROLLS WITH A WIDTH OF >= 45 CM, CONSISTING OF A LAYER OF PLASTICS FIXED PERMANENTLY ON A BACKING OF ANY MATERIAL OTHER THAN PAPER, THE FACE SIDE OF WHICH IS GRAINED, EMBOSSED, COLOURED, DESIGN-PRINTED OR OTHERWISE DECORATED", ON A SUPPORT IMPREGNATED, COATED OR COVERED WITH POLY"VINYL CHLORIDE"	197,123	63,031	56,355	1,361	1,502	3,820
39181090	FLOOR COVERINGS OF POLYMERS OF VINYL CHLORIDE, WHETHER OR NOT SELF-ADHESIVE, IN ROLLS OR IN THE FORM OF TILES (EXCL. THOSE ON A BACKING COATED, IMPREGNATED OR COVERED WITH POLY"VINYL CHLORIDE")	125,533	64,155	58,364	3,300	1,676	814
Film and sheets							
39199010	SELF-ADHESIVE PLATES, SHEETS, FILM, FOIL, TAPE, STRIP AND OTHER FLAT SHAPES, OF PLASTICS, WHETHER OR NOT IN ROLLS > 20 CM WIDE, FURTHER WORKED THAN SURFACE-WORKED OR OTHER THAN MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	23,346	4,349	3,478	320	505	35
39199038	SELF-ADHESIVE PLATES, SHEETS, FILM, FOIL, TAPE, STRIP AND OTHER FLAT SHAPES, OF CONDENSATION POLYMERIZATION PRODUCTS AND REARRANGEMENT POLYMERIZATION PRODUCTS, WHETHER OR NOT CHEMICALLY MODIFIED, WHETHER OR NOT IN ROLLS OF A WIDTH OF > 20 CM, NOT WORKED, OR ONLY SURFACE-WORKED, OR ONLY CUT TO RECTANGULAR, INCL. SQUARE, SHAPES (EXCL. OF POLYESTERS, AND	9,568	1,482	829	647	6	1

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	FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)						
39199061	SELF-ADHESIVE PLATES, SHEETS, FILM, FOIL, TAPE, STRIP AND OTHER FLAT SHAPES, OF PLASTICISED POLY"VINYL CHLORIDE" OR OF POLYETHYLENE, WHETHER OR NOT IN ROLLS > 20 CM WIDE, UNWORKED OR NOT FURTHER WORKED THAN SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	94,183	9,746	5,127	3,491	77	1,052
39199090	SELF-ADHESIVE PLATES, SHEETS, FILM, FOIL, TAPE, STRIP AND OTHER FLAT SHAPES, OF PLASTICS, WHETHER OR NOT IN ROLLS > 20 CM WIDE, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. THOSE OF ADDITION POLYMERIZATION PRODUCTS, CONDENSATION AND REARRANGEMENT POLYMERIZATION PRODUCTS, AND FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	111,921	23,309	15,327	4,871	2,784	326

CN8 code	Description	EU27,intra	EU27,extra	Asia	Americas	Switzerland, Norway, Iceland	Rest of the world
39204310	PLATES, SHEETS, FILM, FOIL AND STRIP, OF NON-CELLULAR POLYMERS OF VINYL CHLORIDE, CONTAINING BY WEIGHT >= 6% OF PLASTICISERS, OF A THICKNESS OF <= 1 MM, NOT REINFORCED, LAMINATED, SUPPORTED OR SIMILARLY COMBINED WITH OTHER MATERIALS, WITHOUT BACKING, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. SELF-ADHESIVE PRODUCTS, AND FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	149,411	21,291	14,059	2,185	4,814	217
39204390	PLATES, SHEETS, FILM, FOIL AND STRIP, OF NON-CELLULAR POLYMERS OF VINYL CHLORIDE, CONTAINING BY WEIGHT >= 6% OF PLASTICISERS, OF A THICKNESS OF > 1 MM, NOT REINFORCED, LAMINATED, SUPPORTED OR SIMILARLY COMBINED WITH OTHER MATERIALS, WITHOUT BACKING, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. SELF-ADHESIVE PRODUCTS, AND FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	60,737	18,089	9,184	1,628	7,081	195
39204910	PLATES, SHEETS, FILM, FOIL AND STRIP, OF NON-CELLULAR POLYMERS OF VINYL CHLORIDE, CONTAINING BY WEIGHT < 6% OF PLASTICISERS, OF A THICKNESS OF <= 1 MM, NOT REINFORCED, LAMINATED, SUPPORTED OR SIMILARLY COMBINED WITH OTHER MATERIALS, WITHOUT BACKING, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. SELF-ADHESIVE PRODUCTS, AND FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	208,653	30,746	23,731	2,241	4,258	502

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39204990	PLATES, SHEETS, FILM, FOIL AND STRIP, OF NON-CELLULAR POLYMERS OF VINYL CHLORIDE, CONTAINING BY WEIGHT < 6% OF PLASTICISERS, OF A THICKNESS OF > 1 MM, NOT REINFORCED, LAMINATED, SUPPORTED OR SIMILARLY COMBINED WITH OTHER MATERIALS, WITHOUT BACKING, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. SELF-ADHESIVE PRODUCTS, AND FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	64,145	16,339	6,032	1,361	8,850	95
39209928	PLATES, SHEETS, FILM, FOIL AND STRIP, OF NON-CELLULAR CONDENSATION POLYMERIZATION PRODUCTS AND REARRANGEMENT POLYMERIZATION PRODUCTS, N.E.S., NOT REINFORCED, LAMINATED, SUPPORTED OR SIMILARLY COMBINED WITH OTHER MATERIALS, NOT WORKED OR ONLY SURFACE-WORKED, OR ONLY CUT TO RECTANGULAR, INCL. SQUARE, SHAPES (EXCL. SELF-ADHESIVE PRODUCTS, FLOOR, WALL AND CEILING COVERINGS IN HEADING 3918 AND POLYIMIDE SHEET AND STRIP, UNCOATED, OR COATED OR COVERED SOLELY WITH PLASTIC)	10,392	1,615	538	639	427	11
39211200	PLATES, SHEETS, FILM, FOIL AND STRIP, OF CELLULAR POLYMERS OF VINYL CHLORIDE, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. SELF-ADHESIVE PRODUCTS, FLOOR, WALL AND CEILING COVERINGS OF HEADING 3918)	70,580	32,162	21,780	2,516	6,622	1,246

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39219055	PLATES, SHEETS, FILM, FOIL AND STRIP, OF CONDENSATION OR REARRANGEMENT POLYMERIZATION PRODUCTS, WHETHER OR NOT CHEMICALLY MODIFIED, REINFORCED, LAMINATED, SUPPORTED OR SIMILARLY COMBINED WITH OTHER MATERIALS, UNWORKED OR MERELY SURFACE-WORKED OR MERELY CUT INTO SQUARES OR RECTANGLES (EXCL. PRODUCTS OF POLYESTERS, PHENOLIC RESINS AND AMINO-RESINS; SELF-ADHESIVE PRODUCTS AND FLOOR COVERINGS OF HEADING 3918)	23,365	10,569	2,627	2,319	4,967	657
39232910	SACKS AND BAGS, INCL. CONES, OF POLY"VINYL CHLORIDE"	23,742	16,351	12,563	1,167	614	2,006
39233010	CARBOYS, BOTTLES, FLASKS AND SIMILAR ARTICLES FOR THE CONVEYANCE OR PACKAGING OF GOODS, OF PLASTICS, WITH A CAPACITY OF <= 2 L	452,646	81,995	23,530	10,203	31,893	16,355
39235090	STOPPERS, LIDS, CAPS AND OTHER CLOSURES, OF PLASTICS (EXCL. CAPS AND CAPSULES FOR BOTTLES)	426,004	44,038	14,824	11,636	13,148	4,418
39261000	OFFICE OR SCHOOL SUPPLIES, OF PLASTICS, N.E.S.	219,558	81,936	73,944	1,337	2,662	3,989
39262000	ARTICLES OF APPAREL AND CLOTHING ACCESSORIES PRODUCED BY THE STITCHING OR STICKING TOGETHER OF PLASTIC SHEETING, INCL. GLOVES, MITTENS AND MITTS	65,028	144,125	142,580	858	129	549
39269092	ARTICLES MADE FROM PLASTIC SHEET, N.E.S.	123,180	115,895	108,159	4,536	2,458	724
39269097	ARTICLES OF PLASTICS AND ARTICLES OF OTHER MATERIALS OF HEADING 3901 TO 3914, N.E.S.	1,717,118	510,741	414,399	47,281	32,341	17,353
Coated fabric and plastisol							

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48115100	PAPER AND PAPERBOARD, SURFACE-COLOURED, SURFACE-DECORATED OR PRINTED, COATED, IMPREGNATED OR COVERED WITH ARTIFICIAL RESINS OR PLASTICS, IN ROLLS OR IN SQUARE OR RECTANGULAR SHEETS, OF ANY SIZE, BLEACHED AND WEIGHING > 150 G/M ² (EXCL. ADHESIVES)	443,137	123,737	2,451	93,984	1,180	26,124
48115900	PAPER AND PAPERBOARD, SURFACE-COLOURED, SURFACE-DECORATED OR PRINTED, COATED, IMPREGNATED OR COVERED WITH ARTIFICIAL RESINS OR PLASTICS, IN ROLLS OR IN SQUARE OR RECTANGULAR SHEETS, OF ANY SIZE (EXCL. BLEACHED AND WEIGHING > 150 G/M ² , AND ADHESIVES)	1,125,765	60,443	10,562	13,459	22,846	13,558
59031010	TEXTILE FABRICS IMPREGNATED WITH POLY"VINYL CHLORIDE" (EXCL. WALLCOVERINGS OF TEXTILE MATERIALS IMPREGNATED WITH POLY"VINYL CHLORIDE")	3,837	5,360	4,931	202	221	6
59031090	TEXTILE FABRICS COATED, COVERED OR LAMINATED WITH POLY"VINYL CHLORIDE" (EXCL. WALLCOVERINGS OF TEXTILE MATERIALS COVERED WITH POLY"VINYL CHLORIDE"; FLOOR COVERINGS CONSISTING OF A TEXTILE BACKING AND A TOP LAYER OR COVERING OF POLY"VINYL CHLORIDE")	29,042	22,273	18,990	910	1,421	952
62104000	MEN'S OR BOYS' GARMENTS OF TEXTILE FABRICS, RUBBERISED OR IMPREGNATED, COATED, COVERED OR LAMINATED WITH PLASTICS OR OTHER SUBSTANCES (EXCL. OF THE TYPE DESCRIBED IN SUBHEADING 6201,11 TO 6201,19, AND BABIES' GARMENTS AND CLOTHING ACCESSORIES)	16,523	38,831	38,178	76	30	517

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62105000	WOMEN'S OR GIRLS' GARMENTS OF TEXTILE FABRICS, RUBBERISED OR IMPREGNATED, COATED, COVERED OR LAMINATED WITH PLASTICS OR OTHER SUBSTANCES (EXCL. OF THE TYPE DESCRIBED IN SUBHEADING 6202,11 TO 6202,19, AND BABIES' GARMENTS AND CLOTHING ACCESSORIES)	13,528	32,506	31,322	114	37	1,014
Wire and cable							
85444110	ELECTRIC CONDUCTORS OF A KIND USED FOR TELECOMMUNICATIONS, FOR A VOLTAGE <= 80 V, INSULATED, WITH CONNECTORS (EXCL. COAXIAL)	-	-	-	-	-	-
85444190	ELECTRIC CONDUCTORS FOR A VOLTAGE <= 80 V, INSULATED, FITTED WITH CONNECTORS, N.E.S.	-	-	-	-	-	-
85444920	CONDUCTORS, ELECTRIC, FOR A VOLTAGE <= 80 V, INSULATED, NOT FITTED WITH CONNECTORS, OF A KIND USED FOR TELECOMMUNICATIONS, N.E.S.	109,541	58,059	46,173	1,282	2,124	8,482
85444980	CONDUCTORS, ELECTRIC, FOR A VOLTAGE <= 80 V, INSULATED, NOT FITTED WITH CONNECTORS, N.E.S.	-	-	-	-	-	-
85445110	ELECTRIC CONDUCTORS OF A KIND USED FOR TELECOMMUNICATIONS, FOR A VOLTAGE > 80 V BUT <= 1.000 V, INSULATED, FITTED WITH CONNECTORS, N.E.S.	-	-	-	-	-	-
85445190	ELECTRIC CONDUCTORS, FOR A VOLTAGE > 80 V BUT <= 1.000 V, INSULATED, FITTED WITH CONNECTORS, N.E.S. (OTHER THAN OF A KIND USED FOR TELECOMMUNICATIONS)	-	-	-	-	-	-
85445910	ELECTRIC WIRE AND CABLE, FOR A VOLTAGE > 80 V BUT <= 1.000 V, INSULATED, NOT FITTED WITH CONNECTORS, WITH INDIVIDUAL CONDUCTOR WIRES OF A DIAMETER > 0,51 MM, N.E.S.	-	-	-	-	-	-

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85445980	ELECTRIC CONDUCTORS FOR A VOLTAGE > 80 V BUT < 1.000 V, INSULATED, NOT FITTED WITH CONNECTORS, WITH INDIVIDUAL CONDUCTOR WIRES OF A DIAMETER <= 0,51 MM, N.E.S.	-	-	-	-	-	-
85445999	ELECTRIC CONDUCTORS, FOR A VOLTAGE > 80 V BUT =< 1 000 V, NOT FITTED WITH CONNECTORS, WITH INDIVIDUAL CONDUCTOR WIRES OF A DIAMETER =< 0.51 MM, INSULATED WITH MATERIALS OTHER THAN PLASTICS OR RUBBER, N.E.S.	-	-	-	-	-	-
85446010	ELECTRIC CONDUCTORS FOR A VOLTAGE > 1.000 V, INSULATED, WITH COPPER CONDUCTORS, N.E.S.	91,498	25,564	12,140	1,279	7,015	5,130
85446090	ELECTRIC CONDUCTORS FOR A VOLTAGE > 1.000 V, INSULATED, NOT WITH COPPER CONDUCTORS, N.E.S.	108,734	33,414	14,942	2,592	13,063	2,819
85446093	85446093 ELECTRIC CONDUCTORS, FOR A VOLTAGE > 1 000 V, WITH CONDUCTORS OTHER THAN OF COPPER, INSULATED WITH PLASTICS OTHER THAN ELASTOMERS, INCL. CROSS-LINKED MATERIALS, N.E.S.	-	-	-	-	-	-
Moulded products and other							
90183900	NEEDLES, CATHETERS, CANNULAE AND THE LIKE, USED IN MEDICAL, SURGICAL, DENTAL OR VETERINARY SCIENCES (EXCL. SYRINGES, TUBULAR METAL NEEDLES AND NEEDLES FOR SUTURES)	140,444	34,010	13,111	15,716	275	4,937
95030021	DOLLS REPRESENTING ONLY HUMAN BEINGS, WHETHER OR NOT CLOTHED	18,084	47,803	47,244	491	7	60
95030041	STUFFED TOYS REPRESENTING ANIMALS OR NON-HUMAN CREATURES	33,431	70,654	69,815	617	16	206
95030049	TOYS REPRESENTING ANIMALS OR NON-HUMAN CREATURES (EXCL. STUFFED)	26,439	60,179	58,886	543	26	731
95069990	ARTICLES AND EQUIPMENT FOR SPORT AND OUTDOOR GAMES N.E.S.; SWIMMING AND	124,239	179,946	168,701	8,523	919	1,799

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	PADDLING POOLS						