



 **aiju** Instituto Tecnológico de producto infantil y ocio



pueriplus

Research into adapting childcare articles to highly demanding markets



RECOMMENDED DESIGN GUIDELINES FOR ADAPTING CHILDCARE ARTICLES TO NON-DOMESTIC ENVIRONMENTS



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Foreword

This publication has been produced by the Technological Institute for Children's Products & Leisure (AIJU) within the framework of the R&D project *Research into adapting childcare articles to highly demanding markets*—PUERIPLUS— subsidised by IVACE, the Valencian Institute of Business Competitiveness of the Generalitat Valenciana, 50% co-financed by the ERDF Operational Programme for the Valencian Region 2014–2020, file: IMDEEA/2018/34

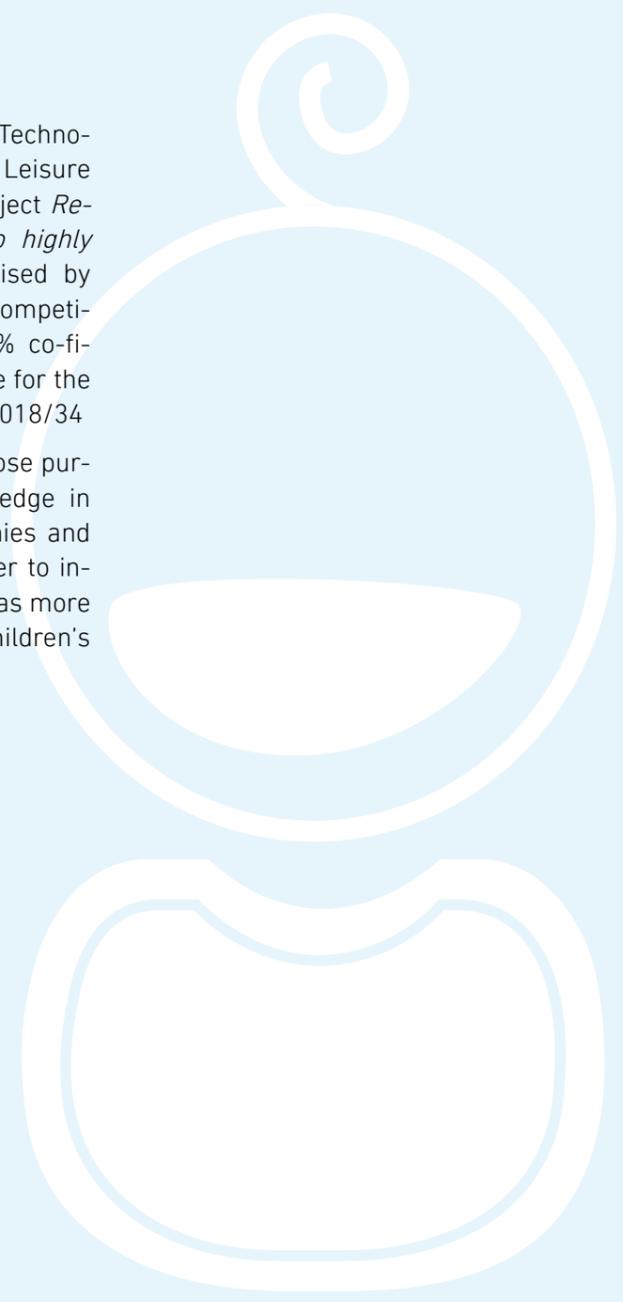
AIJU is a private non-profit organisation whose purpose is to promote innovation and knowledge in children's products and leisure for companies and organisations, as well as technology transfer to industry, both in Spain and internationally. It has more than 470 partner companies related to the children's products industry and the child consumer.

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Introduction

There are more than 500 companies in the Community of Valencia which share the distinguishing feature of being focused on the market for products and services for children. It is worth highlighting that almost all toy manufacturing in Spain is concentrated in the Community of Valencia—as is the childcare industry, which also has a high presence in this region—and they are world leaders in their field.

Childcare articles represent a potential market for companies and industries that do not have a previous connection with the child consumer. This is especially true of the plastic industry, as manufacturers of plastic containers or parts have a huge potential to adapt their products to the child consumer, as a means of diversifying their market.

Although childcare articles are designed to be used in the home, they are also used in other environments. There are important differences between domestic use and non-domestic use that have an impact on product safety. At present, most EU safety standards do not address the dangers of childcare articles used in these non-domestic contexts.

Furthermore, there is a growing demand for equipment that is suitable for intensive use and adapted to the particular requirements of certain markets such as tourist accommodation, restaurants or educational centres.

For this reason, the PUERIPLUS project was developed to investigate how articles designed for domestic use behave in non-domestic contexts, and to generate the knowledge for Valencian industry to be able to produce value-added articles that are suitable for conditions of intensive use. The research focused on three types of childcare articles: highchairs, cots, and children's tableware.

CATEGORIES



The selection of the product categories was made based on the preferences of the companies participating in the project, market demand, and the prevalence of the product in non-domestic environments.

1. Why are we making this guide?

Companies in the childcare articles industry are focused on the manufacture and commercialisation of children's products for use in the domestic environment, directed mainly at the final consumer—parents and caregivers.

However, schools, nurseries and various other establishments require equipment that is suitable for intensive use, adapted to the particular requirements of the non-domestic environment. Increasingly, tenders for the provision of equipment for public facilities such as nursery schools or nurseries give special consideration to children's products with designs that are adapted to their real conditions of use.

Furthermore, there are market segments that have a focus on children as a central factor, and which are outside the usual sales channels for this type of product. Providing a "child-friendly" environment is an added value for services aimed at the general public, which is particularly important in the tourism sector. Children are the core focus of family tourism, and in almost 90% of cases children affect the decisions for adult's holidays. One of the characteristics of family tourism is that the product is often more important than the destination when making the purchase decision.

This Guide is the final result of the PUERIPLUS project (2017–2018), whose objective is to provide Valencian companies with the necessary knowledge to give added value to their children's products, distinguishing them from those of the competition by being suitable for highly demanding contexts such as nursery schools, kindergartens, hotels, leisure centres, and restaurants. In this way, the project aims to help Valencian industry place children's products on the market that feature all the safety guarantees for use both in the home and also in non-domestic environments.

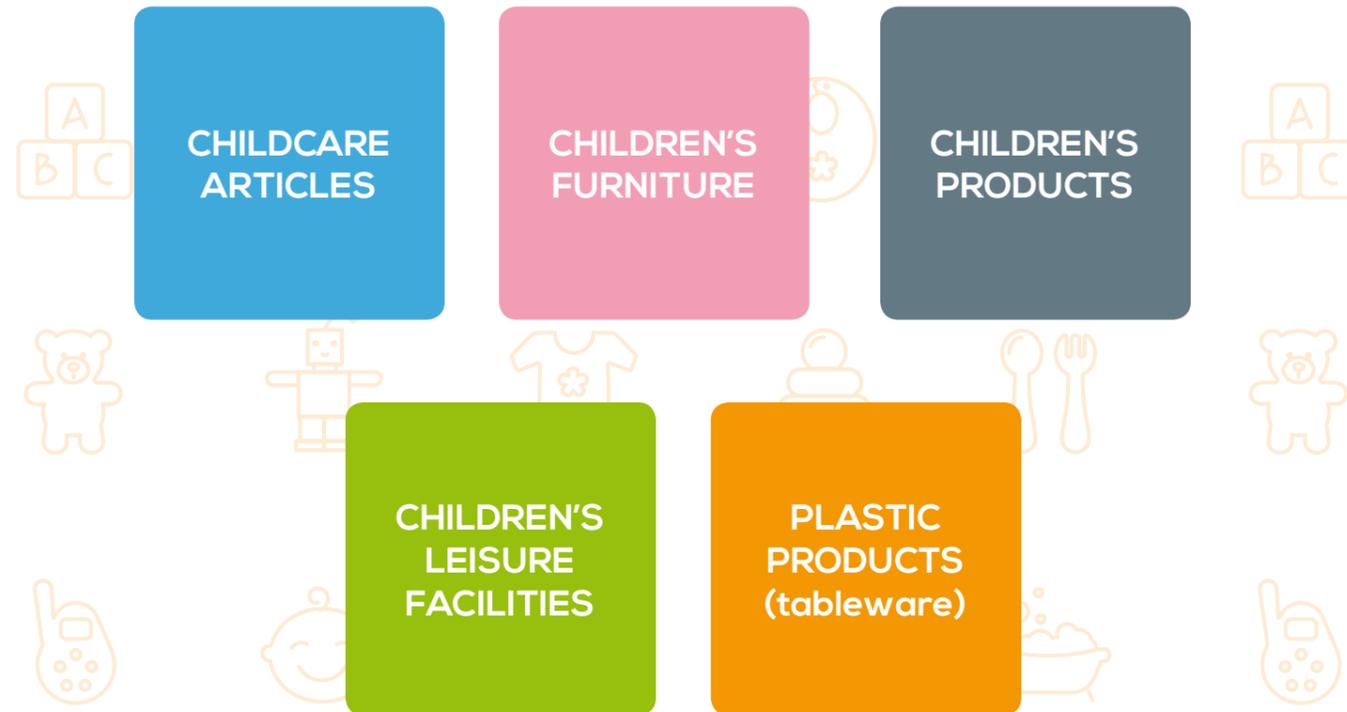
This Guide is designed to help manufacturing companies in the Valencian Community improve their articles, by providing them with a safety margin for conditions of use in non-domestic environments.

The recommendations provided in this Guide are the result of the research carried out by the AIJU team taking into account the state of the art at the time of publication. It should be remembered that the articles must comply with regulations and standards applicable in force.



This Guide is intended for Manufacturing companies

The first part of the Guide is aimed at **manufacturing companies of Comunitat Valenciana** of childcare articles, children's furniture, plastic items sectors, among others. The Guide provides design recommendations for adapting childcare articles to non-domestic environments.



Service providers

The second part of the Guide is aimed at service providers (infant schools, hotels, restaurants, leisure centres etc that make children's equipment available to clients during the course of their business activity), with recommendations on the use of articles for minimising risks in these environments.



2. Are there differences between the domestic and non-domestic use of childcare articles?

There are important differences between domestic use and non-domestic use that have an impact on product safety. In the home, the same child always uses the same product and parents/caregivers have access to the instructions for use, have installed or assembled the item and use it regularly, so they are trained in the use of the product.

Due to certain factors inherent in the non-domestic environment (many children being in the vicinity of the product, a lower level of supervision, caregivers not being familiar with the use of the product, intensive use of the product, etc.), the risk of children having serious injuries may increase as a consequence of using products intended for domestic use in non-domestic contexts.



3. What are the non-domestic environments where childcare articles are used?



Non-Domestic Environment: For Children



Description	Environments intended for children. Establishments with equipment and facilities designed for child users and with staff that are specialised in children and in the use of the articles.
Characteristics of use	The children's articles are used by specialised personnel who supervise a large number of children. In some cases, the level of risk may increase due to the simultaneous interaction of a large number of children in the same place.
Possible risk factors	Lower level of supervision. Greater number of children in the vicinity of the article.
Locations	Nursery schools, kindergartens, children's play centres, establishments specialising in child users which include the age range of 0–4 years.



Non-Domestic Environment: Not For Children



Description	Establishments designed with adults in mind (as the main target), but which may occasionally provide for the needs of the child user/consumer.
Characteristics of use	The products are operated by parents/caregivers who are not familiar with the articles, and the personnel are not knowledgeable of the risks derived from the assembly, use and maintenance of this type of article.
Possible risk factors	Less knowledge of the product. Inadequate maintenance.
Locations	Hotels/tourist accommodation, restaurants, public places (airports, public facilities), retail sector (department stores, supermarkets, etc.)

4. Case studies

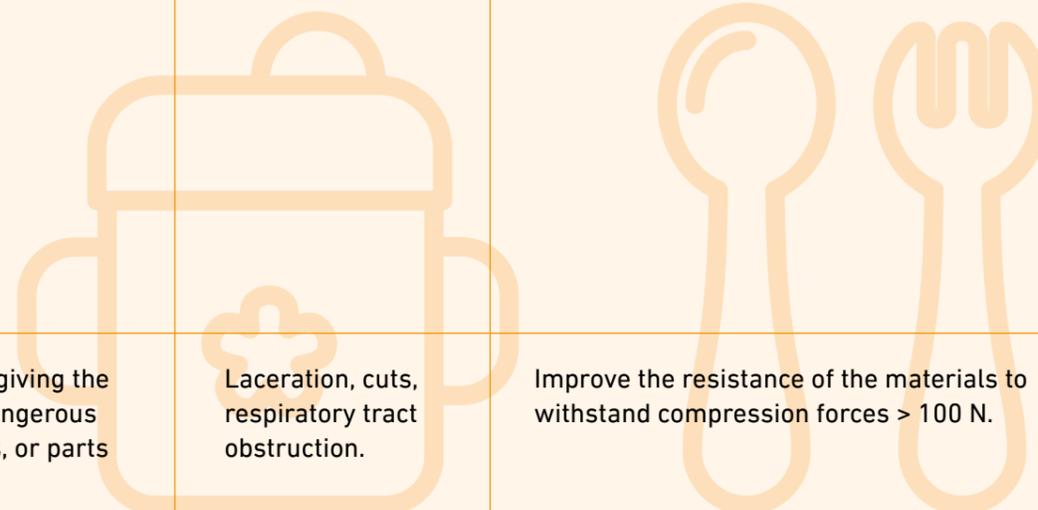


The design recommendations obtained from the research into the behaviour of highchairs, cots, and children's tableware used in non-domestic environments are presented below.



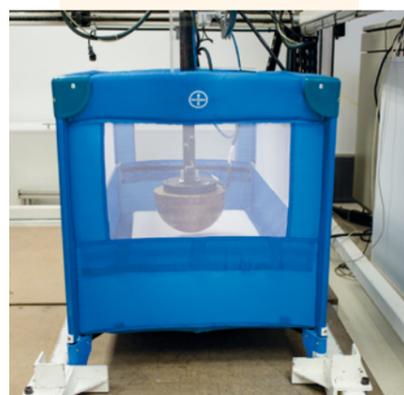
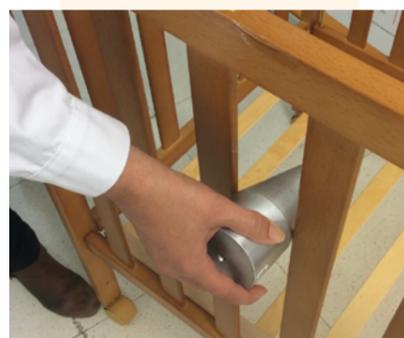
Design Recommendations for Children's Tableware suitable for Non-Domestic Environments

	Recommendation	Factor Safety / Quality	Hazard	Typical injury scenario	Typical injury types	Risk reduction strategy
	R1. Small parts	S	Small part	The child swallows a small part, this part becomes lodged in the larynx and blocks the respiratory tract.	Internal obstruction of the respiratory tract, choking, brain damage.	Avoid components that fit in the cylinder for small parts commonly used in the technical documentation for children's products. This cylinder enables the danger of a small piece to be evaluated. Components that are large enough to not fit inside the cylinder can be considered to represent a tolerable risk in terms of the danger of small parts.
	R2. Adhesion of decorative elements	S/O	Adhesion of decorative elements: The adhesion of decorative elements is affected by washing conditions. Significant colour loss and detachment of the decorative elements is observed when compared to the original sample. This may become a safety issue if it results in the transfer of printing constituents from the decorations to the food.	The child ingests the toxic substance.	Toxicity	Improve of the adhesion of printed decorations and motifs so that there is no loss of colour and/or decorations following intensive use.
	R3. Mechanical resistance	S	Low mechanical resistance (to compression forces in cutlery handles).	The item breaks, giving the child access to dangerous parts, small parts, or parts with sharp edges.	Laceration, cuts, respiratory tract obstruction.	Improve the resistance of the materials to withstand compression forces > 100 N.





Design Recommendations for COTS suitable for Non-Domestic Environments



Recommendation	Factor Safety / Quality	Hazard	Typical injury scenario	Typical injury types	Risk reduction strategy
R1. Size and shape of the gaps and separations between parts accessible to children in the vicinity	S	Gaps and separations between parts accessible to children in the vicinity of the cot.	The child in the vicinity of the cot introduces a body part (head or limbs) into the opening, the head or limbs become trapped, an injury occurs.	Head entrapment of the (closing of the respiratory tract, restriction of blood flow leading to brain damage).	Limit the size and shape of openings so the child cannot insert the body part, or make the opening large enough so that it does not cause entrapment; the child may insert and remove the body part.
R2. Protective barriers suitable for the child using the cot	S	Inadequate protective function. Cots must have sides that prevent the child from climbing over them and leaving the "safe" space.	The child in the cot climbs over the side and falls	Fractures, bruises.	The protective barriers must be suitable for the child's age and abilities. In the case of cots, the protective barrier is determined by the inner height of its sides and ends and the thickness of the mattress. The thickness of the recommended mattress should be such that the inner protective heights are at least 500 mm when the bed base is in its lowest position.
R3. Mechanical resistance of raised bases in travel cots	S	Low mechanical resistance, the textile support structure of the raised base has a low mechanical resistance.	The baby on the raised base falls and collides with the base struts or the base of the cot	Bruises, fractures, concussion. Children using raised bases are especially vulnerable, as they are babies who are not able to sit on their own (usually infants from birth to 6 months).	Improve the resistance of the textiles that form the raised base, or eliminate the raised bases from travel cots for non-domestic use, and offer travel cots for use in a single position: the lowest and, therefore, the safest.
R4. Mechanical stability of travel cots	S	Low mechanical stability.	The child is inside the cot, external forces are applied and the cot overturns. The child falls on the floor.	Bruises, fractures, concussion.	Use heavier struts, with the same dimensions, for the supporting structure of cot bases, or modify the design of the cot and the distance between base supports to make the cot more stable.



Design Recommendations for HIGHCHAIRS suitable for Non-Domestic Environments



Recommendation	Factor Safety / Quality	Hazard	Typical injury scenario	Typical injury types	Risk reduction strategy
R1. Size and shape of the gaps and separations between parts accessible to the child who is using the product	S	Gaps and separations between parts accessible to the child using the product.	The child in the highchair slides (feet first) through the opening, becomes trapped by the torso/neck, cannot relieve the pressure, and an injury occurs.	Closure of the respiratory tract, restriction of blood flow leading to brain damage.	Limit the size and shape of the openings so that the child can not slip through the opening feet first and become trapped by the torso/neck.
R2. Size and shape of the gaps and separations between parts accessible to children in the vicinity	S	Gaps and separations between parts accessible to children in the vicinity of the highchair.	A child in the vicinity of the highchair inserts his head in an opening, the head becomes trapped, an injury occurs.	Closure of the respiratory tract, restriction of blood flow leading to brain damage.	Limit the size and shape of the openings so that the child cannot insert his head or make the opening large enough so that it does not cause entrapment; the child may insert and remove his head without becoming trapped
R3. Moving parts accessible to children in the vicinity	S	Parts that move in relation to each other caused by the movement of the user of the article.	The child in the highchair generates movement between two rigid parts, a child in the vicinity of the highchair inserts a finger between the parts, incurring an injury to the finger.	Bruises, fractures, crushing. The severity of the injuries depends on the potential of the parts to cause damage.	Avoid the presence of parts that can be closed with a separation of less than 12 mm.
R4. Protective function	S	Inadequate protection	The child in the highchair is not in an effective restraint system, breaking free from it. The child falls from the highchair.	Bruises, fractures, concussion	Use active and/or passive restraint systems that comply with current safety regulations.
R5. Mechanical stability	S	Low mechanical stability.	The child is using the highchair, external forces are applied and the highchair is overturned.	Bruises, fractures, concussion.	Use heavier materials, with the same dimensions, or modify the design of the highchair, with a wider base, so that the article is more stable.
R6. Mechanical resistance	S	Low mechanical resistance.	The product does not withstand use; it breaks. This results in dangerous parts and the child is injured.	Various injuries (bruises, fractures, concussion).	Improve the design and/or materials.



5. What information should accompany the article for it to be used in non-domestic environments?

- 1 Advise the buyer, and future maintainer, of the product to retain the product information for future reference.
- 2 Provide information on the suitability of the article for non-domestic contexts, having performed the corresponding validation. For example, for children's tableware, the number of dishwasher washing cycles the article can withstand could be indicated, or in the case of heavy childcare items, information could be provided stating that the product has a high mechanical resistance that is higher than the minimum required by the corresponding standard for domestic use.
- 3 Specific safety warnings related to use in non-domestic environments, which are essential in order to avoid injuries.
- 4 Specific use instructions for non-domestic use:
 - Washing, cleaning and disinfection methods, prior to first use and on subsequent uses.
 - Appropriate inspection and maintenance methods for the use of the article in question.
 - Common improper methods of use, heating, cleaning and storage that could damage the product.
 - Warning signs indicating that the product should be discarded and replaced with another.
- 5 Information on the advisability of informing the end-users and customers of establishments (hotels, leisure centres, restaurants, etc.) on who the item is intended for (age, weight and capacity), the main risks that may be involved in using the article, and how to take the necessary precautions.
- 6 Raise awareness about the importance of training the personnel in charge of maintenance of the articles in the establishments, in order to offer a better service.



Remember that childcare articles must provide the product use information as required by European safety regulations. In addition to this information, if your product is intended for use in non-domestic contexts, instructions that cover non-domestic use should be incorporated.

6. General design recommendations for childcare articles suitable for non-domestic environments

As a result of the applied research on highchairs, cots and children's tableware, certain hazards associated with the use of childcare articles in non-domestic environments have been identified. Based on these hazards, a series of general design recommendations have been developed to minimise the risks associated with these hazards.



Table of hazards identified in non-domestic use

SMALL PARTS

LOW MECHANICAL RESISTANCE

INADECUATED PROTECTION FUNCTION

GAPS AND OPENINGS

MOVING PARTS

LOW MECHANICAL STABILITY

LACK OF INFORMATION

LACK OF TRAINING



Decalogue of recommendations

1 Always avoid the presence of small parts in articles



Childcare articles should be designed so that they do not have components that can become separated and are susceptible to being ingested by the child.

Injuries arising from a small part becoming stuck in a child's larynx and blocking his airways can be very serious as a result of reduced oxygen flow to the brain.

4 Barriers suitable for confining the child within a space.



If we take the example of a cot or a safety barrier, the height of the side should be enough to prevent the child from going over the protective barrier. Again we must consider that the article may be used by various users of different ages, and therefore different motor abilities. Some skills that the child acquires also present new dangers. For example, a child who is able to climb and keep his balance better may try to "escape" from the cot.

5 Effective restraint systems.



Although the articles are equipped with restraint systems, we must ensure that they meet the current European safety regulations. In products where the child is seated in an elevated position, it is essential to have a good retention system, either active or passive, to prevent falls.

6 Limit the size of gaps and openings to prevent the entrapment of body parts, especially of children in the vicinity of the article.



Products must be designed in a way that minimises any risk of a child in the vicinity of the product trapping his head or other part of his body. By limiting the size of the openings it is possible to prevent the head from fitting through the gap, or by making the opening so large that it allows the head and the rest of the body to pass through, in this way there is no possibility of entrapment.

7 Avoid having moving parts that are accessible to children in the vicinity of the article



Very often there are parts that move in relation to each other due to the movement of the child using the article. In these circumstances, children who are in the vicinity may insert their finger into gaps between the parts and incur injuries.

2 Adequate resistance to the washing, cleaning and disinfection methods required for the non-domestic environment



In environments such as nursery schools the tableware must frequently be washed at high temperature to achieve adequate disinfection. If we want our products to be used in these environments we must ensure that they have adequate resistance to being washed in an industrial dishwasher and that this treatment does not affect the safety of the article.

3 Adequate mechanical strength of the parts of the article



During use in non-domestic contexts, it is highly probable that the article will be subjected to intensive conditions of use, due to the prolonged use of the article by different users. Consider a highchair that is provided to families in restaurants. This highchair may be used by children of various ages during its lifetime.

8 Designs and materials that give the product a high degree of mechanical stability



It is important that the products are sufficiently stable to minimise the risk of falling over. This is achieved through appropriate designs. In the case of folding articles, it is advisable to achieve a balance between sufficient stability and the weight of the product.

9 Specific information on the product regarding non-domestic use, for the market, end users, and the personnel responsible for the articles



As a dual-use childcare article, not only must it be accompanied by the information specified in the corresponding European safety regulations, but it should also provide additional information on the use of the article in non-domestic contexts.

Manufacturers

Provide information with safety warnings, and instructions for use, cleaning, and specific maintenance for non-domestic use.

For non-domestic contexts

Provide the client with information on how to use the article safely.

It is worth mentioning that the safety of the article depends significantly on it being used correctly. For this reason, it is important that when the article in question is provided in non-domestic environments—for example, a cot in a hotel—the client is provided with basic information.

10 Provide training to those in charge of the maintenance and cleaning of the article



Training the personnel who perform the tasks of inspection, cleaning, and maintenance of the articles is essential in order to foresee possible safety flaws and act in time.

7. How do we ensure the proper use and maintenance of articles in our establishments?

Recommendations for service providers



1. WHAT TYPE OF ITEM DOES YOUR CLIENT NEED? WHO IS IT AIMED AT?

- Before supplying the product, inform your clients about the intended user of the article and the function it was designed for. Basic information such as recommended age, maximum weight and/or the child's required abilities may be crucial for safe use.

2. HOW IS IT USED? BASIC PRECAUTIONS

- Create a user-friendly manual for each type of item and supply it to your customers when delivering the product. Alert your customer about how to use the product correctly, and the possible consequences of not doing so.
- Provide an explanation of the basic safety recommendations. If your establishment is geared towards families, this compassion and awareness of child safety will be highly appreciated by your customers.

3. WHAT TO DO IF A CLIENTS DETECT A FAULT OR HAVE DOUBTS ABOUT HOW IT OPERATES?

- Offer your clients a point of contact to answer any questions they have about the item and/or if they encounter any problems during use. Involve your customers and allow them to become "inspectors" of the product. This information can provide very useful feedback for the continual improvement of your service.

4. HOW CAN I IMPROVE THE SAFETY OF THE ARTICLES IN MY ESTABLISHMENT?

Key points:

- Remember to make responsible purchases when buying childcare products. Make sure that the products meet the minimum safety requirements established by the rules and regulations currently applicable.
- Ensure that personnel have the necessary training to carry out the inspection and maintenance of childcare articles and are able to provide customers with suitable articles that have been designed for a child of the corresponding age, and in safe conditions.
- Establish adequate cleaning and maintenance programmes for each category of product, and review them periodically to adapt to the real conditions of use (high season, type of client, life cycle of articles, etc.)



Safety is everyone's business

Thanks

The PUERIPLUS project has been carried out by AIJU in collaboration with 11 companies in the childcare industry from the Valencia Region.

We would like to thank the collaborating companies for the valuable contribution they have made to the development of the project.



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This Guide is available in digital format to all those interested via the AIJU website:
www.aiju.info

