



- (51) International Patent Classification:
C08J 9/00 (2006.01) C08J 9/34 (2006.01)
- (21) International Application Number:
PCT/IB2018/055003
- (22) International Filing Date:
06 July 2018 (06.07.2018)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
110821 04 July 2018 (04.07.2018) PT
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,

(54) Title: UNIVERSAL TRAY FOR THE ACCOMMODATION AND TRANSPORT OF ELECTROSTATIC DISCHARGE SENSITIVE DEVICES BASED IN INTEGRAL SKIN FOAM

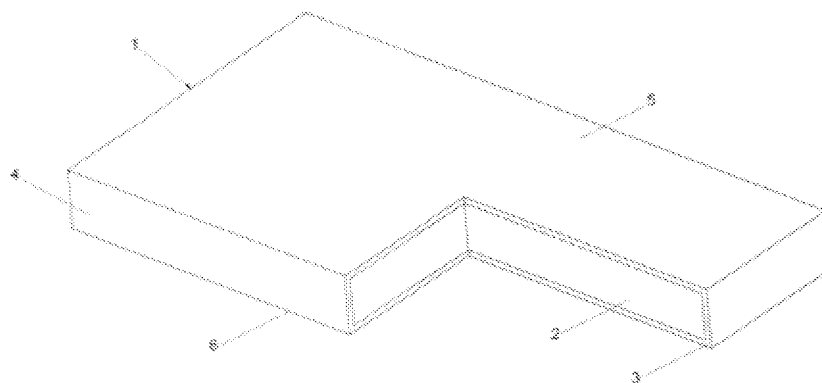


Figure 1

(57) Abstract: The present application relates to a universal tray for electrostatic discharge sensitive devices. Safe storage and transportation of electrostatic discharge sensitive devices such as printed circuit boards, integrated circuits, electronic components, is mandatory in order to prevent premature damage. The present solution consists in a foam block (1) made of static dissipative flexible foam core (2) with integral skin (3), with laterals (4), top (5) and bottom (6), to store and safely transport these devices. This universal tray allows the direct contact with these types of devices without causing excessive strain over the fragile components and solder joints. The present solution allows for a secure accommodation and transport, protection from mechanical damage and electrostatic discharges within the packaging system. Due to the simplified and universal design, the present technology allows a reduction of the total number of trays and consequently, the total number of packaging systems and allocated storage areas.



CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
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OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

DESCRIPTION

"UNIVERSAL TRAY FOR THE ACCOMMODATION AND TRANSPORT OF ELECTROSTATIC DISCHARGE SENSITIVE DEVICES BASED IN INTEGRAL SKIN FOAM"

Technical field

This application relates to a universal tray for the storage and transport of electrostatic discharge sensitive devices (ESDS).

Background art

Electronic products comprise electronic systems and components, e.g. printed circuit boards, integrated circuits which go through a series of processing steps during the manufacturing. Electronic systems have become more complex and specific to best suit new function abilities. Within the increasing of complexity in their configuration, these electronic systems have also become highly sensitive to damage by mechanical efforts and from electrostatic discharges (ESD) and fields. Devices that are sensitive to the electrostatic discharge phenomenon are classified as electrostatic discharge sensitive devices (ESDS) and require extra care during handling, storage, and transport. In general, in fabricating facilities ESDS are transported in between locations for different operations, e.g. mounting of components, testing, assembly.

In order to minimize premature damage probability related to electrostatic discharges, research focused in the modification and development of materials to provide ESD protection. An electrostatic discharge occurs due to the build-up of static electricity in materials, which may occur by friction. The accumulation of static electricity

is greater in electrically insulating materials, because these materials inhibit the flow and dissipation of the accumulated charges. Therefore, improving the electrical conductivity properties of packaging materials was widely pursued as exemplified in U.S. Pat. No. 2004/025996A1, U.S. Pat. No. 2009/0242845A1, U.S. and Pat. No. 2015/0274924A1.

Commonly, packaging materials for ESDS are composed by conductive materials. These materials immediately discharge static electricity, preventing the accumulation of electrostatic charges. However, due to the high conductivity, the discharge may be too fast and induce a spark which can create an electric field that, in turn, can induce harmful electrical charges on nearby ESDS. Therefore, materials classified as electrostatic dissipative, which are in between the anti-static and the conductive range, are more suitable for this type of application. Electrostatic dissipative materials present a higher electrical surface resistance compared to conductive materials, and hence, a slower rate of discharge of the accumulated charges. For this reason, increasing effort has been focused into the development of novel low-cost electrostatic dissipative materials. For example, U.S. Pat. No. 6,101,083 discloses an apparatus for eliminating electrostatic discharge damage to integrated circuits that includes the use of an electrostatic dissipative plastic carrier.

Besides the material development, several packaging design solutions have been explored and presented for the safe storage and transportation of ESDS, ranging from containers for a single ESDS as in U.S. Pat. No. 6,401,930B1 and U.S.

Pat. No. 5,738,219A to tote boxes with features to assemble structures for the accommodation of variable ESDS as in U.S. Pat. No. 4,261,464 and U.S. Pat. No. 4,506,785.

The most commonly employed solution in manufacturing units is the stackable dedicated tray solution. Dedicated trays are designed in such a way that allow the perfect fitting and accommodation of a specific ESDS configuration, in specific predefined zones. This solution assures the safety in regarding to mechanical efforts from shocks and vibrations, which could lead to excessive strain/stress over the ESDS components and solder joints, and also from ESD phenomenon. Some examples include U.S. Pat. No. 7,410,060 and U.S. Pat. No. 6,868,970B2 which disclose a stackable plastic tray for integrated circuit chips while U.S. Pat. No. 5,474,178A presents a packaging plastic tray for supporting electrical connectors.

Due to the design specificity and the variable ESDS configurations for different electronic products, the use of stackable dedicated trays gathers some issues. For instance, there is a constant need for new specific trays to be developed for the new electronic systems. Typically, there are diversified stackable dedicated trays in use simultaneously, for the production of numerous variable electronic products. Also, when the production for a certain electronic product is paused, a larger number of stackable dedicated trays is occupying storage area while awaiting a new need. Likewise, when an electronic product becomes obsolete, the corresponding stackable dedicated trays become no longer necessary and require recycling management.

Hence, the main drawbacks of such solution include: large areas allocated for storage; longer lead times for the

design and fabrication of new trays and for the recycling of disposable ones; more packaging systems, like tote box and lid to contain the stackable dedicated trays; and greater associated costs, which all combined, entail logistical problems.

An alternative possibility to substitute the stackable dedicated trays consists in the use of a soft material that assures energy absorption from shocks and vibrations simultaneous to providing cushioning and protection to the ESDS. Examples of such soft materials include flexible foams made of polyurethane or other polymeric based materials. These materials are already employed in similar demanding applications. For example, in U.S. Pat. No. 4,851,286A is disclosed a cushioning element of a polymeric foam material for placement between an impacting surface and a surface of an object to be cushioned against damage caused by impact during transport or storage. U.S. Pat. No. 2003/0102244 A1 discloses a shipping and storage container for laptop computers, which includes an inner protective base insert and an inner protective cover insert, both inserts being fabricated from a protective foam material. Flexible foams can be modified to present static dissipative properties by adequate formulation, and have been used extensively as a packaging and supporting material of highly sensitive equipment such as ESDS, e.g. printed circuit boards, integrated circuits. In U.S. Pat. No. 2004/0259966 A1 is disclosed a method to prepare a static dissipative flexible polyurethane foam by incorporating anti-static additives and in U.S. Pat. No. 2015/0274924 A1 is presented the development of electrostatic dissipative electronic packaging materials based on polyurethane foams. Examples of applications for static dissipative flexible foams include U.S. Pat. No.

5273158A that discloses a package fabricated from flexible polyurethane foam for the storing and the transportation of small electronic components, e.g. capacitors, resistors, diodes, transistors. In some cases, foams have been provided in sheets and slabs as a base upon which integrated circuits and wafers may rest. U.S. Pat. No. 2015/0083638A1 discloses a wafer container comprising upper and lower foam cushions or positioned above and below the container. U.S. Pat. No. 2005/0210665A1 discloses a microelectronic transport tray with the lower surface covered by a resilient sheet layer made of foam. U.S. Pat. No. 6,286,684B1 discloses a container for integrated circuit wafers that provides protection for the wafers from mechanical shock and electrical charges. Top, bottom and side cushions made of foam mechanically protect the wafers. For other applications, as for example, the storage of printed circuit boards, the polymeric foams may be moulded or carved during its manufacture into cavities corresponding with the shape of the particular printed circuit board to being supported. In U.S. Pat. No. 2004/0060843 A1 is presented the invention of a transportation tray that has a top layer of foam and walls surrounding a plurality of tear-out pieces made of foam. This tray shows much flexibility for the transportation of a large variety of items, but is not made of static dissipative material and its manufacture is rather complex. In addition, is more suitable for shipping goods outside of a factory and not to the transport of goods within a manufacturing unit.

The majority of the flexible foams presented can release foam particles, which could lead to the contamination and even malfunction of the ESDS. A possibility to circumvent this matter is to resource to integral skin foams. The

integral skin foam consists of a low density foamed core surrounded by a high density skin of the same material, and it may also be modified during formulation to exhibit ESD properties at the conductive and electrostatic dissipative range. Several methods for the production of flexible polyurethane foams with integral skin have been disclosed as in U.S. Pat. No. 5,132,329, U.S. Pat. No. 5,236,960 and U.S. Pat. No. 5,449,698.

Typical solutions are based in thermoplastic materials with a certain level of rigidity that allow the fitting of the ESDS, in specific locations. The most commonly employed solution considers stackable dedicated trays which, although efficient, present some drawbacks related to the design, by being too specific to a single product, hence the designation of dedicated, and by presenting complex features, that are achieved by either more demanding processes as injection moulding or thermoforming, which although simpler, requires the pre-production of the sheet to be thermoformed. Other issues related to logistic matters include: constant need to fabricate new trays and recycle of disposable ones; large quantity of packaging systems, for example tote box and lid to accommodate the trays during the operation cycle, and during the pause of the operational cycle; extensive areas allocated for storage; more complex fabrication process not only related to the manufacturing technologies, but also to the design rules for avoiding contact with fragile areas and components.

Further examples in the prior art include the use of softer materials, as for example, flexible foams. The majority of solutions based in flexible foams are directed for the packaging and shipping of goods outside manufacturing

units, and therefore, not adequate for implementation in this type of solution. Some of the disclosed foam solutions that may be employed for the stow and transport of ESDS include flexible foams used with other structures, rigid and flexible, that provide the ESD protection, while other solutions report the possibility of being electrostatic dissipative. For the application purpose, the use of additional structures is adding complexity to the fabrication process and handling. In addition, when employing these foams, particles can be released from the foam structure contaminating the ESDS while also enabling premature damage or malfunction.

Finally, no solution for this particular application purpose was found to consider the use of integral skin flexible foams.

In view of the abovementioned, it would be desirable to provide a new packaging solution to stow and transport ESDS while overcoming the above stated drawbacks.

Summary

The present application related to a universal tray for the accommodation and transport of electrostatic discharge sensitive devices comprising a foam block (1) which comprises a flexible foam core (2) with an (3) integral skin, wherein the material of the foam block comprises an anti-static additive.

In one embodiment the anti-static additive is a carbon black compound.

In another embodiment the core density value ranges between 150 and 190 kg/m³.

In yet another embodiment the anti-static additive promotes an electrostatic discharge property at the electrostatic dissipative range surface resistance between $10^5\Omega$ and $10^8\Omega$.

In one embodiment the universal tray presents both a smooth surface or a convoluted surface with diversified features.

In another embodiment the universal tray presents the top surface and bottom surface with variable surface configurations.

The present application also relates to a process to obtain the flexible foam with integral skin comprising the following steps:

- Homogenisation of the polyol
- Mixing the polyol with an anti-static additive;
- Homogenisation of the mixture
- Addition of isocyanate to the previous mixture to obtain the foam formulation;
- Homogenisation of the mixture;
- Pouring or injection of the formulation into a mould;
- The final product is demoulded and left to cure at room temperature between 15° and 25°C.

In one embodiment the moulding temperature ranges between 40°C to 70°C.

In another embodiment the moulding time is between 15 to 25 minutes.

In yet another embodiment the polyol integrates the water based blowing agent and all the compounds necessary.

In one embodiment the polyol is selected from polyether or polyester polyurethane foams.

In one embodiment the polyol is used in a quantity ranging between 70% and 80%.

In another embodiment the anti-static is used in a quantity ranging between 4% and 10%.

In another embodiment the isocyanate is selected is methylenebis(phenyl isocyanate) or toluene diisocyanate.

In yet another embodiment the isocyanate is used in a quantity ranging between 20% and 30%.

General description

The solution disclosed herein provides a universal tray based on a moulded integral skin flexible foam. Integral flexible foams have the advantage of safely cushioning and holding the electrostatic discharge sensitive devices (ESDS), such as printed circuit boards, integrated circuits, electronic components, within a tote box and a lid, protecting from shocks and vibrations. In addition, integral skin flexible foams are lightweight, resulting in a weight reduction of the packaging system, and do not require complex machinery to be moulded, reducing the fabrication cost. The integration of electrostatic dissipative properties is quite simple and doable during the formulation of the foam. Also, with the proper material selection and combination with the design structure, it is

possible to provide universal application and hamper unwanted movements of the ESDS within foam trays.

The main goal of this application is to present the method and the universality of an integral skin flexible foam with electrostatic dissipative properties for the safe accommodation and transport of variable ESDS configurations.

The present application discloses a universal tray based on an integral skin flexible foam, with electrostatic dissipative properties. With this approach it is possible to circumvent a series of issues related to the presented solutions of the prior art mainly due to its simplicity, universality and reusability for variable ESDS configurations, lightweight, possibility of direct contact with the ESDS without damaging mechanically and electrostatically, and simplified fabrication process.

The main improvements are:

- The present technology consists of a universal, simple, lightweight and flexible tray made of flexible static dissipative foam with integral skin, for the safe stow and transport ESDS within tote box with a lid. This solution simplifies both the fabrication and cleaning process and assures a proper and safe stow of sensitive electronic devices also while in transport;
- The use of an integral skin flexible foam modified to present electrostatic discharge properties to build up a universal tray allows reusability of the tray for variable electronic products, while assuring the same safety in terms of mechanical efforts and electrostatic discharges;

- The use of a foam with integral skin increases product lifetime and minimises the contamination probability of the ESDS due to the release of small particle foams;
- The processing method for the universal tray is based in foam moulding where the anti-static additive is integrated into the polyol component and homogenised, followed by the mixture with an adequate percentage of isocyanate which is then injected into a mould where the foam grows and the integral skin is formed. This processing method is simpler and requires less equipment and shorter production times;
- The use of such material to fabricate stackable trays improves the logistics associated by reducing lead times due to process simplicity, reducing the total packaging system quantity and weight, less allocated storage areas, associated costs.

Brief description of drawings

For easier understanding of this application, figures are attached in the annex that represent the preferred forms of implementation which nevertheless are not intended to limit the technique disclosed herein.

Figure 1 shows a cross sectional perspective view of a possible design configuration for the universal tray. The references are as follows: 1 - foam block, 2 - flexible foam core, 3 - integral skin, 4 - laterals, 5 - top surface, 6 - bottom surface.

Description of embodiments

Now, embodiments of the present application will be described with reference to the annexed drawings. However,

they are not intended to limit the scope of this application.

The present application relates to a universal and versatile tray for ESDS.

A safe storage and transportation of ESDS is mandatory in order to prevent premature damage. Most available solutions are specific to a single ESDS, either by presenting features that avoid contact with critical areas reducing stress/strain efforts or, when in contact, by presenting features that are cut to measure.

The present solution consists in a universal tray made of electrostatic dissipative flexible foam with integral skin, with a surface resistance between $10^5\Omega$ - $10^8\Omega$, to safely store and transport ESDS within a packaging system.

The universal tray allows the direct contact with the ESDS without causing excessive strain/stress over the fragile components and solder joints. In addition, due to the simplified and universal design, the present technology can be employed for any type of ESDS which allows a reduction of the total number of stackable dedicated trays and consequently, the total number of packaging systems and allocated storage areas. This universality also improves logistic as it consists of a simpler method that reduces the typical lead times associated to the development and fabrication of stackable dedicated trays, for each individual ESDS configuration.

Regarding the manufacturing process, in comparison to injected or thermoformed plastic trays, integral skin flexible foams require simpler equipment, making the process less complex, which contributes to the reduction of costs.

The technology disclosed herein is used to suitably accommodate ESDS of the most various configurations for transport inside company facilities and even for shipping. Such packaging solution assures the protection of the product contained within from environmental effects e.g., electrostatic discharges and fields, vibrations and shocks which may lead to premature failure or malfunction. The present technology is reused for the same part and, when necessary, it also enables the safe packaging of different configurations of ESDS without any extra step. This is related to the universality achieved by the combination of design features with material formulation.

The flexible foam with integral skin described herein is made by a one-shot process involving over-packing in a mould of a mixture of the polyol component, which includes the water blowing agent, with an anti-static additive, and an isocyanate reactive component for the reaction to occur generating carbon dioxide which makes the foam grow. In this case, the blowing agent is water based which in reaction with isocyanate generates carbon dioxide which makes the foam grow.

The anti-static additive percentage, between 2% and 8%, is such that assures an ESD property at the electrostatic dissipative range, surface resistance between $10^5\Omega$ and $10^8\Omega$.

The methodology to produce the flexible foam with integral skin requires the thorough mixing, by means of a conventional foam mixing machine or equivalent equipment high speed mixer, of the described ingredients in a liquid state and in critical proportions. The polyol varies between 70% and 80%, isocyanate varies between 20% and 30%,

and anti-static additive varies between 2% and 8%. The defined critical proportions allow obtaining a flexible foam with a high density integral skin and a core density value ranging between 150 and 190 kg/m³. The homogenised mixture is immediately poured/injected into the heated cavity of a closed mould, at a temperature ranging between 40°C to 70°C. The shape of the mould cavity is identical to the shape of the intended product and the surface characteristics of the mould surface, either smooth or patterned, is acquired by the expanding foam integral skin. The reaction starts within a very short time, between 5 to 10 seconds since the beginning of mixture, from the commencement of mixing, with the volatilization of the blowing agent, thus beginning foam formation. The over-packaging considered an amount of foam mixture from 1 to 3 times the amount which would form a foam equal in volume to the volume of the mould cavity if allowed to expand. After a pre-defined moulding time, between 15 to 25 minutes, the fabricated foam is demoulded and left to finalize the cure at room temperature, between 15 and 25°C, obtaining this way, the universal tray.

The formulation for the flexible foam include: polyol such as polyether or polyester poly-urethane foams, integrating the blowing agent, such as water; the isocyanate such as methylenebis(phenyl isocyanate) or toluene diisocyanate. In one embodiment the anti-static additive is carbon black compound.

The polyol is used in a quantity ranging between 70% and 80%. The anti-static is used in a quantity ranging between 4% and 10%. The isocyanate is used in a quantity ranging between 20% and 30%.

The formulation for the production of the flexible foam with integral skin is established as fixed, and the design configuration may be variable, if necessary. Typically, foam flexibility or rigidity is achieved by variations in the formulation. In this application, the flexibility is achieved by the variability of the design features and dimensions, creating structures and patterns that provide different compressive stress-strain behaviours, while the remaining foam properties are maintained.

The method to obtain the flexible foam with integral skin comprises the following steps:

- Polyol homogenisation;
- Mixing the polyol with an anti-static additive;
- Homogenisation of the mixture;
- Addition of isocyanate to the previous mixture to obtain the foam formulation;
- Homogenisation of the mixture;
- Pouring or injection of the formulation into a mould;
- The final product is demoulded and left to cure at room temperature.

In one embodiment the isocyanate selected from a list to specifically react with the selected polyol, generating carbon dioxide which makes the foam grow and is commonly used for the production of flexible foams with integral skin.

The mixture, beginning of the reaction, is performed within a mixing chamber of the applicator which then injects the mixed material into the mould, where the reaction continues and the flexible foam hardens while forming the integral skin. After a pre-defined moulding time, the fabricated foam

is demoulded and left to cure. Once fully cured, it is obtained the universal tray, suitable for all ESDS configurations.

In this technology, the flexibility is achieved by the variability of the design features and dimensions, creating structures and patterns that provide different compressive stress-strain behaviours, while the remaining foam properties are maintained.

Figure 1 shows the present technology which consists of a foam block (1) with a flexible foam core (2) and an integral skin (3) and variable dimensions in accordance to the packaging to be contained within.

The flexible foam block (1) presents all laterals (4) with a smooth surface. In one embodiment, the top surface (5) and the bottom surface (6) of the flexible foam block, they present both a smooth surface or a convoluted surface with diversified features. In another embodiment, the top surface (5) and bottom surface (6) may present variable surface configurations, e.g. top surface (5) smooth and bottom surface (6) convoluted and vice versa. These convoluted features may be, for example, cylindrical, conical, pyramid, oval, cubic and with variable dimensions regarding height, base area and draft angles, when existent. The described features may protrude or groove from the surface. In some cases, a single feature may be replicated across the foam surface while in other configurations, different features may be replicated simultaneously along the foam surface.

The ability to configure the surface structure to best accommodate variable configurations of ESDS, while in

direct contact and without inferring damage, is greatly advantageous as it allows the reusability of the present invention to a multiplicity of ESDS and packaging systems. The integral skin provides protection from possible contamination and malfunction that could arise from foam particles release, and associated with a flexible foam with variable design configurations provides safe cushioning and protection from mechanical damaging, e.g. shocks and vibrations. Finally, an electrostatic formulation based in the inclusion of an anti-static additive into the foam formulation allows the protection of the ESDS from possible electrostatic discharges and fields.

This description is of course not in any way restricted to the forms of implementation presented herein and any person with an average knowledge of the area can provide many possibilities for modification thereof without departing from the general idea as defined by the claims. The preferred forms of implementation described above can obviously be combined with each other. The following claims further define the preferred forms of implementation.

CLAIMS

1. Universal tray for the accommodation and transport of electrostatic discharge sensitive devices comprising a foam block (1) which comprises a flexible foam core (2) with an (3) integral skin, wherein the material of the foam block comprises an anti-static additive.
2. Universal tray according to the previous claim wherein the anti-static additive is a carbon black compound.
3. Universal tray according to the previous claim, wherein the core density value ranges between 150 and 190 kg/m³.
4. Universal tray according to any of the previous claims, wherein the anti-static additive promotes an electrostatic discharge property at the electrostatic dissipative range surface resistance between 105Ω and 108Ω.
5. Universal tray according to any of the previous claims, wherein it presents both a smooth surface or a convoluted surface with diversified features.
6. Universal tray according to any of the previous claims, wherein it presents the top surface and bottom surface with variable surface configurations.
7. Process to obtain the flexible foam with integral skin described in claims 1 to 5, comprising the following steps:
 - Homogenisation of the polyol

- Mixing the polyol with an anti-static additive;
 - Homogenisation of the mixture
 - Addition of isocyanate to the previous mixture to obtain the foam formulation;
 - Homogenisation of the mixture;
 - Pouring or injection of the formulation into a mould;
 - The final product is demoulded and left to cure at room temperature between 15° and 25°C.
8. Process according to the previous claim, wherein the moulding temperature ranges between 40°C to 70°C.
9. Process according to any of the claims 7 to 8, wherein the moulding time is between 15 to 25 minutes.
10. Process according to the previous claim, wherein the polyol integrates the water based blowing agent and all the compounds necessary.
11. Process according to the previous any of the claims 7 to 10, wherein the polyol is selected from polyether or polyester polyurethane foams.
12. Process according to any of the claims 7 to 11, wherein the polyol is used in a quantity ranging between 70% and 80%.
13. Process according to any of the claims 7 to 12, wherein the anti-static is used in a quantity ranging between 4% and 10%.

14. Process according to any of the claims 7 to 13, wherein the isocyanate is selected is methylenebis(phenyl isocyanate) or toluene diisocyanate.
15. Process according to any of the claims 7 to 14, wherein the isocyanate is used in a quantity ranging between 20% and 30%.

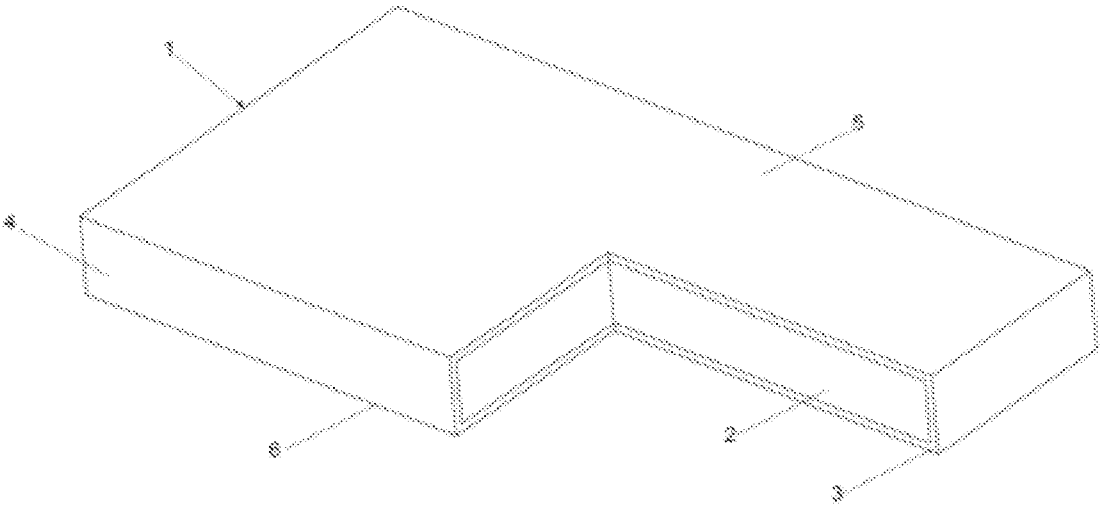


Figure 1

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/055003

A. CLASSIFICATION OF SUBJECT MATTER
INV. C08J9/00 C08J9/34
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C08J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 476 714 A1 (BASF SE [DE]) 18 July 2012 (2012-07-18) paragraphs [0007] - [0009], [0017], [0020], [0061], [0062], [0066], [0067], [0069]; claims 1,4-6 -----	1-8, 10-15
X	EP 0 482 476 A2 (BASF AG [DE]) 29 April 1992 (1992-04-29) column 4, line 1 - line 28 column 5, line 50 - column 6, line 7 column 10, line 4 - line 9 column 19, line 50 - column 20, line 3 column 21, line 22 - line 35 column 21, line 41 - column 23, line 13; claim 1 ----- -/--	1-8, 10-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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Date of the actual completion of the international search

7 March 2019

Date of mailing of the international search report

18/03/2019

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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Magrizo, Simeon

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2018/055003

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/066598 A1 (BASF SE [DE]; MOHMEYER NILS [DE]; FREIDANK DANIEL [DE]; ORTALDA MARCO) 17 June 2010 (2010-06-17) page 7, line 35 - line 37 page 8, line 27 - line 30 page 15, line 5 - line 16 page 15, line 41 - page 16, line 8 page 16, line 17 - line 39 page 17, line 9 - line 14 page 18, line 1 - line 13; claims 7-9 -----	1-8, 10-15
X	WO 2009/065826 A1 (BASF SE [DE]; ORTALDA MARCO [IT]; SPITILLI TONY [IT]) 28 May 2009 (2009-05-28) page 2, line 18 - line 23 page 5, line 40 - page 6, line 4 page 6, line 33 - line 36 page 10, line 1 - line 11 page 10, line 30 - line 39; claims 1-3,9,10; table 1 -----	1-8, 10-15
X	US 4 576 855 A (OKINA TOYOHICO [JP] ET AL) 18 March 1986 (1986-03-18) column 1, line 8 - line 11 column 6, line 3 - line 12 column 6, line 21 - line 48 column 7, line 65 - column 8, line 4 column 8, line 32 - line 33 column 9, line 5 - line 12 column 10, line 29 - line 36 column 11, line 28 - line 40 -----	1-8, 10-15
X	US 3 182 104 A (CWIK LESTER L) 4 May 1965 (1965-05-04) column 1, line 12 - line 21 column 2, line 64 - line 72 column 3, line 23 column 3, line 30 - line 33 column 3, line 66 - line 68 column 5, line 47 - line 61 column 6, line 8 - line 12 -----	1,2,4-7, 9-11,14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2018/055003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2476714	A1	18-07-2012	DE 102012200272 A1	19-07-2012
			EP 2476714 A1	18-07-2012

EP 0482476	A2	29-04-1992	AT 153357 T	15-06-1997
			CA 2054170 A1	27-04-1992
			DE 4034082 A1	30-04-1992
			DE 59108711 D1	26-06-1997
			DK 0482476 T3	16-06-1997
			EP 0482476 A2	29-04-1992
			ES 2100918 T3	01-07-1997
			JP H04285621 A	09-10-1992
			US 5110834 A	05-05-1992

WO 2010066598	A1	17-06-2010	DE 112009003509 A5	31-05-2012
			WO 2010066598 A1	17-06-2010

WO 2009065826	A1	28-05-2009	NONE	

US 4576855	A	18-03-1986	JP H0252666 B2	14-11-1990
			JP S5918733 A	31-01-1984
			US 4576855 A	18-03-1986

US 3182104	A	04-05-1965	NONE	
