

## Halogen-free Flame retardant textiles

### **EP1973440 - FLAME-RESISTANT CLOSURE**

*BINDER GOTTLIEB GMBH & CO KG*

Published 2008-10-01

Priority date 2006-11-30 (WO)

The invention relates to a flame-resistant closure comprising at least one closing part having at least one two-dimensional backing fabric from warp threads and weft threads and having functional threads on the right side of the backing fabric that at least partially extend through the backing fabric and that form the closing elements. The backing fabric is of the non-flame-resistant type and at least some sections of its reverse side comprise a substrate layer with a hardly inflammable medium and/or with an active extinguishing medium. The closure according to the invention meets even high demands on low inflammability.

(From WO2007082570 A2)

### **US20070231574 - FLAME-RETARDANT PLASTIC COMPOSITION, YARN AND TEXTILE STRUCTURE COATED THEREWITH**

*CHAVANOZ IND*

Published 2007-10-04

Priority date 2007-05-15 (US)

The invention concerns a halogen-free flame retardant plastic composition, for coating a substrate, comprising an acrylic resin and an intumescent agent. It is in the form of plastisol, and comprises therefore a plasticizing medium wherein the acrylic resin and the intumescent agent are dispersed, said plastisol being formulated such that, in combination: the viscosity remains not more than 6000 mPa·s, measured with a Brookfield RVT viscometer at 20 revolutions per minute, its rheological behaviour is pseudo-plastic and Newtonian.

### **US20090044341 - FLAME RESISTANT TICKING THAT REDUCES FLAME PROPAGATION AND UPHOLSTERED ARTICLES INCORPORATING SAME**

*PREC FABRICS GROUP INC*

Published 2009-02-19

Priority date 2008-08-15 (US)

A method of producing a flame resistant ticking includes laminating a flame resistant substrate to a decorative fabric, wherein the substrate is configured to release a chemical vapor that reduces the rate of propagation of a flame along the decorative fabric when the decorative fabric is exposed to flame. The substrate is laminated in direct contact with the inside surface of the decorative fabric. In some embodiments, the laminated ticking is configured to release less than 15 MJ of heat in the first ten minutes when exposed to a flame in accordance with the testing protocol set forth in 16 CFR 1633. Upholstered articles, such as mattresses, mattress foundations, and articles of furniture, may incorporate the flame resistant ticking layer.

### **CN101200834 - FLAME-PROOF TEXTILE**

*TORAY FIBER RES INST CHINA CO*

Published 2008-06-18

Priority date 2006-12-12 (CN)

The invention discloses a fire retardant fabric which contains fire retardant polyester fiber. The fabric uses twill or satin or backed weave as a main weaving organization structure. And the limit oxygen index value of the obtain fire retardant polyester fiber is above 28. The product of the invention has the advantages of perfect fire retardant property, halogen-free and low toxicity. And the invention is applied to indoor decoration articles of carpets, curtains, etc. and occasions with high fire retardant requirement of bed clothes, etc.

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### **WO2009123969 - DEOXYBENZOIN-DERIVED ANTI-FLAMMABLE POLYMERS**

UNIV MASSACHUSETTS

Published 2009-10-08

Priority date 2008-03-31 (US)

The invention provides novel flame-retardant polymers and materials, their synthesis and use. More particularly, the flame-retardant polymers are deoxybenzoin-derived polymers.

### **JP2008126713 - NON-HALOGEN SYSTEM VEHICULAR CUSHION FLOORING SEAT**

SUMINOE TEXTILE

Published 2008-06-05

Priority date 2006-11-17 (JP)

**PROBLEM TO BE SOLVED:** To provide a non-halogen system vehicular cushion flooring seat with sufficient fire-resistant performance not making a human body feel slight vibration of a vehicle floor, not generating a harmful gas in combustion and attaining light weight.

**SOLUTION:** In the non-halogen system vehicular cushion flooring seat, a floor seat not transmitting influence of vibration produced by a structure of a railway vehicle to the human body as much as possible is formed, and resin strength is outstandingly enhanced by using a modified resin for a resin layer and magnesium hydroxide as a fire retardancy agent in order to solve the problem of light weight and fire retardancy. Further, strength of a backing layer is increased by substituting woven fabric for non-woven fabric even in the backing layer and since strength can be obtained even if it is thin, the light weight can be attained. By applying a non-woven fabric molded body constituted by a polyester fiber only to a portion contacted with the human body of a cushion part, the non-halogen system vehicular cushion flooring seat, lighter in weight than conventional, excellent in work efficiency, less generation of the harmful gas in combustion and improved in durability is obtained.

### **EP1820895 - TREATED ARTICLES AND METHODS OF MAKING AND USING SAME**

ROHM & HAAS

Published 2007-08-22

Priority date 2006-02-21 (US)

Treated articles and methods of making and using the same are disclosed. The treated articles comprise a substrate selected from a fiber, a textile, a non-woven and a paper treated with a treatment that imparts flame resistance to the substrate.

### **EP1798318 - FLAME-RETARDANT SYNTHETIC FIBER, FLAME-RETARDANT FIBER COMPOSITE, AND UPHOLSTERED FURNITURE PRODUCT MADE WITH THE SAME**

KANEKA CORP

Published 2007-06-20

Priority date 2005-08-10 (WO)

A flame resistant synthetic fiber having advanced flame resistance is provided. Furthermore, the flame resistant synthetic fiber may preferably be used in textiles used for furniture, such as beddings and chairs, such as mattress, and sofa, etc. that need extremely high carbonizability rendered highly flame resistant by flame resistant agents and advanced flame resistance. The present invention also aims at obtaining upholstered furniture products using the flame resistant fiber composite having advanced flame resistance. That is, the present invention relates to a flame resistant fiber composite consisting of a flame resistant synthetic fiber (A) not less than 10 parts by weight, and at least one fiber (B) selected from a natural fiber and/or a chemical fiber (B) not more than 90 parts by weight, the flame resistant synthetic fiber (A) comprising 100 parts by weight of a polymer containing halogen atom of not less than 17% by weight, 3 to 50 parts by weight of a zinc compound, 0 to 30 parts by weight of an antimony compound, and 3 to 30 parts by weight of an other inorganic compound, a total amount of these compounds being not less than 15 parts by weight, and also relates to upholstered furniture products using the flame resistant fiber composite.

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### **DE602004009592 - FLAME RETARDANT COMPOSITION WITH EXCELLENT PROCESSABILITY**

UNION CARBIDE CHEM PLASTIC

Published 2007-11-29

Priority date 2003-09-05 (US)

The present invention is a flame retardant composition comprising (a) a first ethylene polymer; (b) a second ethylene polymer having a density less than 0.95 grams/cubic centimeter and being modified with an unsaturated aliphatic diacid anhydride; (c) a flame retardant; and (d) an ultra high molecular weight polysiloxane. The invention also includes a coating prepared from the flame retardant composition as well as a wire-and-cable construction made by applying the coating over a wire or a cable. The invention also includes articles prepared from the flame retardant composition, such as extruded sheets, thermoformed sheets, injection-molded articles, coated fabrics, construction materials and automotive materials.

(From WO2005023924 A1)

### **WO200450980 - METHODS, SYSTEMS AND COMPOSITIONS FOR FIRE RETARDING SUBSTRATES**

NEOWORLD FIBERS LLC

Published 2004-06-17

Priority date 2002-11-29 (US)

The invention relates to "closed loop" processes, systems and compositions for providing flame retardant properties to substrates containing at least about 5 weight percent of non-thermoplastic material, such as non-thermoplastic fibers, fibrous compositions or fabrics, and to treated substrates. The processes and systems are environmentally friendly, and advantageously conserve chemical compounds and water by recycling flame retardant composition. The processes generally comprise: (a) applying a flame retardant composition containing one or more flame retardant substances, an aqueous liquid and one or more adhesion agents to substrates; (b) removing excess flame retardant composition from the substrates; (c) permitting the substrates to dry to a low moisture content; and (d) recycling excess flame retardant composition; wherein the flame retardant composition does not contain an amount of a dye or other agent that could contaminate the flame retardant composition.

### **US20040097156 - FLAME-RETARDANT NONWOVENS**

MCGUIRE SHERI L (US); TAYLOR THOMAS E (US) (Inventors)

Published 2004-05-20

Priority date 2002-11-18 (US)

The present invention concerns a flame retardant (FR) nonwoven fabric useful in household goods and particularly for mattresses. The nonwoven fabric comprises from about 6 to 25 weight % of a low melt binder, and least one of FR rayon fiber, FR acrylic fiber, FR melamine fiber, or FR resin and optionally synthetic and/or natural fiber. From this nonwoven fabric, many household goods such as drapes, curtains, rugs, bedding and particularly mattresses may be constructed. The present invention also contemplates a mattress constructed from the nonwoven fabric comprising FR rayon fibers, FR acrylic fibers, FR resin, and non FR polyester fibers, and about 6 to about 25 weight % low melt binder. The mattress from this construction passes the California Test Bulletin 129 stringent conditions for mattresses used in public places. Preferably the nonwoven fabric has a batt weight of at least 5 oz./sq. yd. and preferably between 5 oz./sq. yd. and 20 oz./sq. yd.

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### **EP1371774 - FLAME-RETARDANT LEATHER-LIKE SHEET SUBSTRATE AND PRODUCTION METHOD THEREOF**

KURARAY CO

Published 2003-12-17

Priority date 2002-06-12 (JP)

The flame-retardant leather-like sheet substrate of the present invention comprises a layer (A) that is made of an entangled nonwoven fabric comprising a polyester superfine fiber (a) of a single fiber fineness of 0.5 dtex or less containing no flame-retardant component and a flame-retardant polyester superfine fiber (b) of a single fiber fineness of 0.5 dtex or less containing a flame-retardant component in a ratio, (a)/(b), of 100/0 to 40/60 by mass, and a layer (B) that is made of an entangled nonwoven fabric comprising the polyester superfine fiber (a) and the flame-retardant polyester superfine fiber (b) in a ratio, (a)/(b), of 70/30 to 0/100 by mass. The entangled nonwoven fabrics of the layers (A) and (B) are impregnated with an elastomeric polymer (c) containing a flame-retardant component. The ratio of the polyester superfine fiber (a) and the flame-retardant polyester superfine fiber (b) in the flame-retardant leather-like sheet substrate is 10:90 to 90:10 by mass. The flame-retardant leather-like sheet substrate and the artificial leather made thereof have an excellent flame retardancy, a soft and high-quality feeling and appearance, a high abrasion resistance and peel strength, and excellent mechanical properties such as surface strength.

### **JP2003247146 - FLAME-RETARDANT POLYESTER FABRIC**

KOMATSU SEIREN CO

Published 2003-09-05

Priority date 2002-02-20 (JP)

**PROBLEM TO BE SOLVED:** To provide a flame-retardant polyester fabric which has an excellent flame-retardant performance, although a halogen-based flame retardant is not used, and is safe from fire when used for curtains, clothes and furniture, nor wasted.

**SOLUTION:** This flame-retardant polyester fiber fabric containing polyester-based fibers having a low melting point of 120 to 255 °C. When a non-halogen-based flame retardant, especially a phosphate-based flame retardant, is used, the more excellent flame-retardant polyester fabric is provided.

### **US20020123286 - MULTIPLE LAYER CLOTH FOR CASINO, GAMING AND BILLIARD TABLES AND METHOD THEREFORE**

GRAPHIC TO GRAPHICS INC

Published 2002-09-05

Priority date 2001-07-12 (US)

The cigar and cigarette burn resistant gaming cloth table includes a layer of fire retardant treated knit fabric laminated to a thin sheet of aluminum and wherein the other side of the aluminum sheet is laminated to a layer of synthetic fabric (preferably, a non-woven fabric). Preferably, the top layer knit fabric is laminated to the aluminum via a latex adhesive. The lower non-woven fabric is (a) laminated to the aluminum sheet via latex adhesive, (b) needle punch mounted to the aluminum, or (c) the aluminum is sprayed onto one or the other of the cloth layers. Preferably, the knit layer, prior to being laminated to the thin sheet of aluminum, is treated with a fire retardant and an oil, alcohol and water repellent and stain resistant chemical composition (preferably, a phosphorus fluorocarbon).

### **EP1375730 - FLAME-RETARDANT LEATHER-LIKE SHEET BASE AND PROCESS FOR PRODUCING THE SAME**

KURARAY CO

Published 2004-01-02

Priority date 2002-02-18 (WO)

The leather-like sheet substrate of the invention comprises a nonwoven fabric of three-dimensionally entangled superfine fibers (A) of at most 0.5 dtex in fineness and a polymer elastomer (B) filled in the entangled interspaces of the nonwoven fabric, in which the superfine fibers (A) comprise an organophosphorus component-copolymerized polyester and the polymer elastomer (B) contains a metal hydroxide or is copolymerized with an organophosphorus component. The leather-like sheet substrate of the invention and artificial leather obtained from it contain no halogen and are resistant to flames. These have a soft feel and are suitable to applications in the interior field that requires flame retardancy, especially to seats for vehicles, etc.

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### **EP1065239 - OLEFINIC THERMOPLASTIC ELASTOMER COMPOSITION**

*JSR ELASTOMIX CO LTD*

Published 2001-01-03

Priority date 1999-06-28 (JP)

An olefinic thermoplastic elastomer composition which does not cause problems by a softening agent such as oils and which is superior in molding processability. The composition of the present invention is produced by heat crosslinking process, to a resin-rubber composition that contains an olefinic and/or diene rubber, an olefinic resin, and the vinyl copolymer. The vinyl copolymer is a copolymer which a vinyl monomer represented by  $\text{CH}_2=\text{CHOCOR}_1$  or  $\text{CH}_2=\text{CHOR}_2$  ( $\text{R}_1$  and  $\text{R}_2$  are alkyl groups which has 1-6 carbon atoms) is copolymerized by 20 or more percent by weight. The composition of the present invention can include the vinyl copolymer that has not undergone the heat crosslinking process.

### **WO9852991 - POLYMER-BOUND NON-HALOGEN FIRE RESISTANT COMPOSITIONS**

*SOLUTIA INC*

Published 1998-11-26

Priority date 1997-05-23 (US)

A flame-retardant polyamide that is the polycondensation product of at least one dicarboxylic acid, at least one diamine and a flame-retarding carboxyphosphinic acid monomer, said polyamide comprising between about .10 and about 1.0 % by weight of phosphorous. The polyamide can be formed into fibers for further fabrication into flame-retardant articles and textiles or directly molded or extruded into shaped articles.

### **WO9937852 - TREATMENT FOR FIBERS, FLAME RETARDANT, METHOD OF IMPARTING FLAME RETARDANCY, AND TREATED SYNTHETIC POLYESTER FIBERS**

*SANYO CHEMICAL IND LTD*

Published 1999-07-29

Priority date 1998-01-26 (WO)

A treatment for fibers which comprises a polyester compound obtained from (A) an aromatic dicarboxylic acid or an anhydride or a lower alkyl ester thereof, (B) a diol, and (C) a phosphinic acid derivative and having a weight-average molecular weight of 500 to 20,000. The treatment comprises halogen-free compounds and can impart long-lasting flame retardancy to synthetic polyester fibers by a post-treatment.

### **EPO908545 - FLAME RETARDANT CLOTH**

*KANEKA CORP*

Published 1999-04-14

Priority date 1997-05-12 (WO)

A flame retardant cloth used as an interior material for the production of, for example, curtains, comprising (A) 60-40 parts by weight of fiber which contains 8-70 wt.% of halogen chemically bonded to a polymer and 1-8 wt.% of Sb compound not chemically bonded to a polymer, and which has a shrinkage factor at 240 °C of not less than 40 % under a load of 300 mg/metric count yarn count, and (B) 60-40 parts by weight of polyester fiber, which compounded making a total of 100 parts by weight. This cloth can retain its high fire retardance even after it has been subjected to a process using a binder, such as pigment printing, and enables the range of application of a compound flame retardant fiber product comprising polyester fiber and halogen-containing fiber to be further widened.

### **EPO669418 - CLEAR FLAME-RESISTANT FABRIC.**

*HEXCEL SOCIETE ANONYME*

Published 1995-08-30

Priority date 1994-02-23 (FR)

Open-weave fire resistant woven is halogen free and contains a flame-retardant layer, based on at least one flame retardant and at least one polymeric binder, and present at most 30, esp.20 wt.% (dry) based on the total woven. Also claimed is the production of the woven by forming a flame retardant layer as above.

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### **EP0668391 - WOVEN OR NON-WOVEN HEAT-SEALABLE FLAME-RESISTANT FIBROUS SUBSTRATE.**

HEXCEL SOCIETE ANONYME

Published 1995-08-23

Priority date 1994-02-18 (FR)

Fibrous woven or non-woven support includes a flame retardant composition which is halogen free and contains a flame retardant and a flexible polymer. The polymer is mixture of at least one polyurethane (PU) and at least one other polymer from polyolefin copolymers, pref. ethylene/vinyl acetate (EVA) copolymers. Also claimed is a blind with a support as above.

### **US4695507 - LOW TOXIC CEILING BOARD FACING**

BURLINGTON INDUSTRIES INC

Published 1987-09-22

Priority date 1985-09-10 (US)

A process for manufacturing a coated, sculptured, nubby fabric useful as a ceiling board facing and the like comprising: (1) applying to at least one face of a nubby, textured fabric substrate a uniform layer of a thick, flame-retardant, non-cellular coating containing a pigment, a flame-retardant and a resin contacting and encapsulating substantially all of the yarns of the substrate with a tough, adherent film, the coating composition when exposed to heat or flame emitting vapors of low-toxicity and low-smoke, and (2) drying the thus-coated substrate.

### **EP0005329 - PROCESS FOR PREPARING A POLY(OXYORGANOPHOSPHATE/PHOSPHONATE) PRODUCT, PRODUCTS THEREOF, USE OF SOME OF THESE PRODUCTS AS FLAME RETARDANTS AND MATERIALS TREATED THEREWITH.**

STAUFFER CHEMICAL CO

Published 1979-11-14

Priority date 1978-04-20 (US)

Phosphorus containing flame retardants are prepared by a two step process having as essential steps: 1. reacting diorgano-organophosphonate with reactant comprising phosphorus oxide reagent to yield a metaphosphate/phosphonate reaction product, and thereafter; 2. reacting the reaction product of step (1) with reactant comprising epoxide to yield poly(oxyorganophosphate/phosphonate) product.

Selected novel poly(oxyorganophosphate/phosphonate) products contain a backbone structure of repeating units represented by the average formula: wherein m is an integer from 1 to 50; R, R<sub>1</sub>, and R<sub>2</sub> are individually selected from saturated hydrocarbon radical, alkaryl radical, aralkyl radical, and aryl radical; and R<sub>3</sub> is: wherein R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub> and R<sub>7</sub> are individually selected from hydrogen atom, hydrocarbon radical, and halogenated hydrocarbon radical.

Articles and compositions such as textiles and polyurethanes are rendered flame retardant by incorporation of poly(oxyorganophosphate/phosphonate) prepared by the process of the invention particularly products of Formula (I).