



FEICA-ASC-CATIA ADHESIVES & SEALANTS CLASSIFICATION MANUAL
Edition 2012



INTRODUCTION

The classification manual provides a common set of market definitions and product categories that can be used to represent the Adhesive and Sealant Industry worldwide.

Historically, in 1996, FEICA published the first European classification manual relating to adhesives only and their fields of application. The document printed in three languages was very well received by the industry. This standardization of the adhesive classification provided the structure for the market reports issued by FEICA.

The scope of the classification manual was later enlarged in 2008 to incorporate the sealant technologies and their fields of application. Moreover, the FEICA classification manual was fully aligned with that used by the ASC in the USA. This initiated the beginning of a harmonized and consistent reporting of comparative data across both regions.

An additional step has now been achieved in 2012. The three leading associations, having a combined representation in excess of 70% of the world adhesive and sealant market, (ASC in the USA, CATIA in China and FEICA in Europe), have joined forces to issue a united classification manual. This document will ease the compilation and comparison of market report data and hence improve the overall understanding and accuracy of our complex and fragmented industry.

We wish to express our thanks for the contributions provided by: ASC, CATIA and FEICA, Monique von Dungen (CHEM Research GmbH) and David Nick (DPNA International Inc.) and a large number of our members and experts.

The new classification manual will be used for future editions of the **FEICA European Adhesives and Sealants Market Reports** compiled by CHEM Research as well as the **ASC North America and Asia-Pacific Market Reports** compiled by DPNA International.

Information on how to purchase these reports is available by contacting ASC, CATIA or FEICA.

DEFINITIONS OF ADHESIVE, SEALANT, PRESSURE-SENSITIVE ADHESIVE

An **adhesive** is a compound that adheres or bonds two or more substrates together. Adhesives may come from either natural or synthetic sources. Some modern adhesives are extremely strong (structural adhesives) and are becoming increasingly important in modern construction and industry. Adhesive is a general term and includes, among others, cement, glue, mucilage, and paste. All of these terms are often used interchangeably.

The strength of attachment, or adhesion, between an adhesive and its substrate depends on many factors, including the means by which this occurs. Adhesion may occur either by mechanical means, in which the adhesive works its way into small pores of the substrate, or by one of several other chemical mechanisms.

In some cases an actual chemical bond occurs between adhesive and substrate. In others, intermolecular forces (like van der Waals) hold the substances together. A third involves the moisture-aided diffusion of the glue into the substrate, followed by hardening. Good wetting of the surface is a pre-requisite for adhesion.

A **sealant** is a soft, pliable material that is used to seal cracks or joints where structural strength is not required. The sealant, initially a fluid or semi-fluid, or alternatively hot applied, placed between two opposing solid materials, becomes solid itself (by solvent evaporation, chemical reaction or both), and bonds to the surfaces to which it is applied. Thus, it accommodates joint movement without adhesion loss. The sealant purpose is to prevent excessive absorption of water, penetration of other liquids, gaseous substances, or airborne particulates. A sealant has the adhesive and cohesive properties to form a permanent seal.

A **pressure-sensitive adhesive** is a distinct category of adhesive used to prepare tapes, labels and related self-adhering products. These adhesives, when dry (solvent free), are aggressively and permanently tacky at room temperature. They can firmly adhere to a variety of dissimilar surfaces upon mere contact without the need of more than finger or hand pressure. They require no activation by water, solvent or heat in order to exert a strong adhesive holding force toward such materials as paper, plastic, glass, wood, cement and metals. They have a sufficiently cohesive holding and elastic nature so that, despite their aggressive tackiness, they can be handled with the fingers and removed from smooth surfaces without leaving a residue. In other instances the adhesive coated substrate may be removed by cohesive failure within the adhesive film.

Classification Scope

Excluded from this classification:

- 1) Formaldehyde condensates used as binders in the manufacture of particleboard (chipboard, MDF, OSB, hard board) and in the manufacture of plywood.
- 2) Binding agents for the manufacture of corrugated board.
- 3) Binder agents for foundry sand and adhesives/coatings for rug backing (carpets).
- 4) Cement-based screeds, leveling compounds and flooring/tile adhesives with a content of less than 5% dry or 20% liquid synthetic dispersed polymer.
- 5) PVC body plastisols used as protective coatings in the automotive industry.
- 6) Casting and potting compounds.
- 7) Adhesives used in the primary fabrication of composite materials.
- 8) "Siliconized" water-based products containing <5% silane.

1. ADHESIVES - MARKET SEGMENTS

1.1 Paper, Board and Related Products

1.1.1 Converting/Packaging

- case and carton manufacture
- paper products and paper bags
- envelopes
- tube winding
- plastic bags
- flexible packaging
- remoistenable gummed tapes, labels, stamps
- tissues and towels
- sterilized medical packages
- case and cardboard carton sealing
- labeling cans, bottles and other containers
- wrapping of foods
- cigarette manufacture and cigarette packaging
- paper-to-board lamination

1.1.2 Flexible Packaging

- dry lamination (film-to-film, film-to-foil, film-to-paper)
- wet lamination (foil-to-paper)

1.1.3 High-Gloss Laminating for Graphic Arts

(OPP-to-paper/cardboard, other including cellulose acetate-to-paper/cardboard)

1.1.4 Bookbinding, Graphic Art Industry integral binding of:

- paperback books
- edition-bound books
- magazines
- catalogues
- directories

1.1.5 Nonwoven Fabrics (Disposables)

- construction of disposable diapers
- feminine hygiene products
- incontinence products
- surgical gowns

1.1.6 Pressure-Sensitive Adhesives

- tapes (medical, packaging, electrical, masking, structural, other)
- labels
- decals
- signs

- stamps
- transfer films
- Self-adhering items (carpet tiles, plastic flooring, wall covering)

1.1. * Exclusions

- Binding agents for the manufacture of corrugated board

1.2 Transportation

1.2.1 Passenger Cars/Light Trucks

Assembly and Components (OEM)

1.2.2 Repair and Maintenance (aftermarket)

1.2.3 Trucks and Buses (OEM)

1.2.4 Bicycles, Motorcycles and Recreational Vehicles (caravans)

1.2.5 Aircraft/Aerospace

1.2.6 Railway (including light rail vehicles-tram)

1.2.7 Shipbuilding and Offshore

1.2.8 Shipping Cargo Containers

1.3 Footwear and Leather

1.3.1 Footwear

(soling/sole attaching, lasting, box toes and counters, repair aftermarket and other applications)

1.3.2 Leather Goods

(handbags, travel goods, purses, belts)

1.4 Consumer/Do-It-Yourself (Retail)

Solid and liquid adhesives sold through retail channels in smaller package units

1.4.1 Household and Do-It-Yourself (DIY)

(includes school, office use; glue sticks; all-purpose glues; contact adhesives; instant glues, wood glues, two-component glues; hot melt sticks, construction and plumbing adhesives)

1.5 Building/Construction/Civil Engineering/Craftsmen

1.5.1 On-Site applications for new work, repair, maintenance, and renovations including:

- flooring: carpet, PVC and linoleum, parquet (solid wood and laminated) and rubber tile adhesives
- wall covering including paper, polymer film and textile adhesives
- attachment of ceiling and sandwich panels
- ceramic and stone, wall and floor tile adhesives (organic and modified cementitious, reference for exclusions page 3, item 4)
- wooden subflooring
- thermal insulation materials

1.5.2 Civil Engineering (bridges, highway, and railroad crossing, pipe)

1.5.3 Off-Site applications

- factory assembled parts (roof trusses, wall sections, laminated beams)
- prefabricated houses

1.6 Woodworking and Joinery

1.6.1 Cabinet making

1.6.2 Furniture Manufacture (attachment of high-pressure laminates membrane pressing, edge gluing/banding; veneering; general assembly)

1.6.3 Window Frames, Door Manufacture

1.6.4 Upholstery

1.6 *Exclusions

- Primary wood bonding (forest products) binding agents for producing particle board (chipboard, medium-density fibreboard, hardboard) and plywood

1.7 Assembly Operations/Other

1.7.1 Sandwich Panel Manufacture

1.7.2 Appliances and Electrical/Electronic Equipment

1.7.3 HVAC (Heating, Ventilation, Air Conditioning)

1.7.4 Mechanical Equipment

1.7.5 Flexible Materials (Fabric/apparel, e.g., engineered textiles, foam, synthetic and natural leather, rubber products)

1.7.6 Medical Applications (assembly of medical equipment; medical/surgical applications)

1.7.7 Sports Equipment and Toys

1.7.8 Abrasives, Filters

1.7.9 Composite Material Bonding for Non-Transportation Assembly

(alternative energy generating components such as turbine blades, nacelles & towers; solar photovoltaic and water heating panels)

1.7.10 Others

All other adhesives not included in any market segments or application sectors listed above.

1.7 *Exclusions

- Binder agents for foundry sand and adhesives/coatings for rug backing (carpets)
- Adhesives used in the primary fabrication of composite materials

2. ADHESIVES - PRODUCT CATEGORIES

2.1 Adhesives Based on Natural Polymers

2.1.1 Vegetable Adhesives (dextrins and starches)

2.1.2 Protein Adhesives (casein, soybean, milk albumen)

2.1.3 Animal glues, blood, tissue, hides, and bones

2.1 *Exclusions

- Adhesives raw material based on natural rubber latex (covered under 2.2.6)

2.2 Polymer Dispersion/Emulsion Adhesives

2.2.1 Vinyl acetate homopolymers (PVAc)

2.2.2 Ethylene vinyl acetate co-and terpolymers (incl. atmospheric and pressure polymerization)

2.2.3 Acrylics and acrylic copolymers (incl. styrene acrylate terpolymers)

2.2.4 Styrene-butadiene rubber (SBR)

2.2.5 Other synthetic rubber lattices (includes polychloroprene latex)

2.2.6 Natural rubber latex

2.2.7 Polyurethane dispersion (PUD)

2.2.8 Others

2.2 *Exclusions

- Cement-based screeds, levelling compounds and flooring/tiling adhesives with a content of less than 5% dry or 20% liquid synthetic dispersed polymer (reference for exclusions page 3, item 4).

2.3 Hot Melt Adhesives (including moisture-cure (reactive) types)

2.3.1 Polyolefins (PE, PP, APP)

2.3.2 Ethylene vinyl acetate (EVA)

2.3.3 Polyamides (PA)

2.3.4 Polyester, saturated (SP)

2.3.5 Styrene block copolymers (e.g., SBS, SIS, SEBS)

2.3.6 Polyurethanes (thermoplastic, plus moisture-curing)

2.3.7 Acrylic and acrylic thermoplastic copolymers

2.3.8 Others (e.g., Polyimide)

2.4 Solvent Based Adhesives

2.4.1 Polychloroprene (CP)

2.4.2 Polyurethanes

2.4.3 Natural and synthetic rubbers

2.4.4 Acrylic

2.4.5 Silicone

2.4.6 PVC copolymers

2.4.7 Other

2.5 Reactive Adhesive Systems (incl. single & two-part thermoset plus UV/EB cure)

2.5.1 Epoxies (EP)

2.5.2 Polyurethanes (including moisture-curing liquid and foaming types)

2.5.3 Polyester, unsaturated (UP)

2.5.4 Acrylates (including cyanoacrylate, dimethacrylate/anaerobics; methacrylate, SGA – second generation acrylics/structural acrylics)

2.5.5 Silicones (1- and 2-part curing systems)

2.5.6 Formaldehyde Condensates (phenolic, urea, melamine, resorcinol)

2.5.7 Silane-Modified Polymers (1- and 2-part curing systems)

2.5.1 * Exclusions

- Casting and potting compounds
- Adhesives used in the primary fabrication of composite materials

2.5.2 * Exclusions

- Polyurethane hot melt types (listed under hot melts)

2.5.6 * Exclusions

- Formaldehyde condensates used as binders in the manufacture of particleboard (chipboard, MDF, OSB, hard board) and in the manufacture of plywood

2.6 Adhesives Based on Water-Soluble Polymers

2.6.1 Polyvinyl Alcohol

2.6.2 Cellulose Ethers

2.6.3 Methylcellulose

2.6.4 Carboxymethylcellulose

2.6.5 Polyvinylpyrrolidone

2.6.6 Other (e.g., Polyvinylmethylether)

2.7 Other Adhesives

All other adhesives not included in any categories listed above, e.g. elastoplastic types.

3. SEALANTS - MARKET SEGMENTS

3.1 Construction

3.1.1 Construction and Renovation (residential, commercial, industrial, mobile/prefab home, metal buildings, roofing)

3.1.2 OEM and/or Maintenance Applications (involving subcomponent fabrication, e.g. countertops, prefabricated trusses, curtain walls)

3.1.3 Insulating Glass, Glazing (OEM, factory glazing, in-house glazing)

3.1.4 Heavy Construction (highways, airfields, bridges, tunnels)

3.1.5 Alternative Energy Generation (fabrication, installation and maintenance of photovoltaic panels, wind energy structures)

3.2 Transportation

3.2.1 Passenger Cars/Light Trucks Assembly and Components (OEM, glazing, NVH1, body sealants, thread locking)

3.2.2 Trucks, Buses, Trailers (OEM, NVH1, glazing, body sealants)

3.2.3 Repair and Maintenance (aftermarket including glazing, body sealants, gasketing)

3.2.4 Commercial and Recreational Watercraft (OEM, glazing, body sealants)

3.2.5 Aircraft/Aerospace (glazing and body sealants, NVH¹, private, commercial)

3.2.6 Railway (including light rail vehicles/mass transit, NVH, subcomponent fabrication)

3.2.7 Ships (primarily engine and equipment bedding plus LNG tanks, offshore oil platform)

3.2.8 Shipping Cargo Containers 3.3 Consumer/Do-It-Yourself (Retail)

3.3.1 Household, Do-It-Yourself (includes caulks, sealants and aerosol foams for retail sale in

small packages)

Note: In some countries, this segment includes purchases by tradesmen of five or less employees.

3.4 Assembly/Other

3.4.1 Appliances (e.g. refrigerators and freezers, HVAC²)

¹ NVH : Noise, Vibration, Harshness

3.4.2 Electronic Equipment Assembly

3.4.3 Metal Cabinets and Housings

3.4.4 Other (caulks and sealants usage not included in market segments or applications listed above)

² HVAC : Heating, Ventilation, Air Conditioning

4. SEALANTS - PRODUCT CATEGORIES

4.1 Oil-Base Caulks (includes polymer-modified versions)

4.2 Acrylic (water-latex and solvent based, including “siliconized” versions)

4.3 Vinyl Acetate (homo- and copolymers)

4.4 Butyls (Polyisobutene)

4.4.1 Solvent based PIB sealants

4.4.2 Preformed PIB strips

4.4.3 Hot Applied PIB sealants

4.4.4 Gun-Dispensable and pumpable sealants

4.4.5 Reactive PIB sealants

4.5 Polysulfides (1- and 2-part systems)

4.6 Polyurethanes (1- and 2-part systems, sealants and foams)

4.7 Silicones (1- and 2-part systems)

4.8 Silane-Modified Polymers (1- and 2-part systems)

4.8.1 Silyl-modified Polyethers (includes “MS” polymers)

4.8.2 Silyl-modified Polyisobutylene (SiPiB)

4.8.3 Silyl-modified Polyurethanes

4.8.4 Silicone modified Polyacrylate

4.8.5 Polyurea backbone

4.8.6 Mixed polymers

4.8 *Exclusions

- “siliconized” water-based products containing < 5% silane
- PVC body sealants (reference Page 3 item 5, for exclusions)
- Other Sealants (not included above)

This can include:

- processed-formulated bitumens
- preformed elastomerics (strips and gaskets)
- formed-in-place gasketing
- tapes