ASC-CATIA-FEICA ADHESIVES & SEALANTS CLASSIFICATION MANUAL 2021 Edition

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. The 2021 version of the manual provides clarity on sub segments and sharpened language.

The new classification manual will be used for future editions of the FEICA European Adhesives and Sealants Market Reports compiled by Smithers as well as the ASC North America compiled by ChemQuest.

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.

Sealants are materials with adhesive properties that are formulated primarily to fill or seal gaps or joints between two surfaces. The main purpose of sealants is to prevent air, water, and other environmental elements from entering or exiting a structure while permitting limited movement of the substrates. Sealants have a suitable viscosity to extrude through a nozzle and then be tooled to a desired profile, or to flow sufficiently for gravitational self-leveling. Sealants are used for a variety of commercial and residential applications and are a critical component for building design and construction. Common sealants include silicone, acrylic, urethane, butyl and other polymeric types.

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.

Pressure sensitive adhesive (PSA) tape can be defined as a continuous flexible strip of cloth, paper, metal or plastic coated on one or both sides with a permanently tacky adhesive at room temperature which will adhere to a variety of surfaces with light pressure (finger pressure) with no phase change (liquid to solid) and usually on a roll.

PSAs can be blends of natural or synthetic rubber and resin, acrylic, silicone or other polymer systems, with or without additives.

Single Coated

An adhesive is applied to only one side of the backing. The backing composition may be paper, polymeric film, foil, nonwoven or high thread count woven cloth. The adhesive composition may be an acrylic, rubber or silicone.
Examples of single coated tapes are electrical, masking, carton sealing and medical.

Double Coated
An adhesive is applied to both sides of a backing. The release liners are commonly paper and coated on both sides of the paper with silicone release agents creating a differential release. The pressure sensitive adhesive is coated on both sides of the carrier which is typically a polymeric film such as 0.5 mil polyester. The adhesive on each side of the carrier may be the same or different chemistries and may have the same or different coating thicknesses.
Examples of double coated tapes include mounting, medical and membrane switch.

Reinforced
In addition to the backing and adhesive, these tapes include a reinforcement layer of woven or knitted cloth or glass strands parallel to the machine direction. Typical backings include polymeric films such as polyethylene and polyester. Rubber based adhesives are the most common but others can be used. Examples of reinforced tapes are duct and filament.

Unsupported
Unsupported PSA tapes (adhesive transfer tapes) consist of release liners and adhesives. The release liners are commonly paper and coated on both sides of the paper with silicone release agents creating a differential release. Acrylic adhesives are commonly used in this application. Examples of unsupported tapes are envelope sealing, graphic attachment and splicing.

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.
9) Acrylics and acrylic copolymers for building coatings and building materials, textiles and fiber processing, leather processing and other fields

1. ADHESIVES - MARKET SEGMENTS & SUBSEGMENTS

1.1 Paper, Board and Related Products

1.1.1 Converting/Packaging

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

1.1.2 Flexible Packaging

Food
Lidding
Medical/Pharma
Industrial

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
masks

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
Binding adhesives for furniture particle board

1.2 Transportation

1.2.1 Passenger Cars/Light Trucks

Assembly and Components (OEM)

Body Shop/Body In White (BIW)-Adhesives for body assembly:

Structural Bonding (Including Reinforcing Film)
Hem Flange Bonding
Anti-Flutter Adhesives
Body Sealing
Expandable Sealants
One Component (1K) & Two Component Adhesives (2K)
Sealants
Other

Sealing-Paint Trim & Final Assembly

Paint Seal Joints
Inner closure for seams & hems
Inner body joints & seams
Other

Adhesives-Post Prime (Pre-Topcoat Structural Bonding) Bonding of:

Hoods
Lids
Doors
Roofs
Grill opening panels
Bumper covers
Other

Interior Applications (Headliners, seating, etc.)

Adhesive and Sealants in Automotive Electronics

(B)EV Batteries & Fuel Cells
Displays & Cameras
Sensors & Switches
Other

Expandable Foams & Sealants Used for Noise Vibration & Harshness (NVH)-(Dampening Adhesives for Body Sealing)

Filling Pillars
Filling other cavities with barrier material

1.2.2 Repair and Maintenance

1.2.3 Trucks, Buses & Trailers (OEM) & Recreational Vehicles

1.2.4 Bicycles, Motorcycles

1.2.5 Aircraft/Aerospace

Military
Commercial

1.2.6 Rail Rolling Stock and Light Rail Vehicles-Trams

1.2.7 Shipbuilding and Offshore

Commercial & Military Ships

Salt and freshwater vessel types include passenger ships, freighters, tankers, platform vessels (PSVs), offshore supply vessels (OSVs), fishing boats and ferries, as well as inland waterway ships, barges and tugboats.

Recreational Vessels
Offshore Wind Turbines, Other Fixed and Floating Marine Structures

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
other

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)

glue sticks
all-purpose glues
contact adhesives
cyanoacrylate glue (super/Instant glues)
two component glues
construction adhesives
hot melt sticks
one/two component foam sealants

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 Page 3, item 4, for exclusions)
wooden subflooring
thermal insulation materials

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

Structural

- Bonded external plate reinforcement for strengthening existing concrete structures
- Bonded composite steel /concrete decks
- Structural Steel work connections
- Chemical Anchors

Non-Structural

- Expansion Joints
- Waterproofing membranes on concrete bridge decks
- Low Viscosity formulations for the injection of sealing cracks
- Resin Mortars or concrete for repair
- Bonding new concrete to old

Semi-Structural

- Wire, rope or strand anchors
- Steel fixings in concrete or rock
- Self-Leveling of epoxy grouts for the support of heavy machinery
- Segmental precast PC structures such as bridges in which epoxides have been as a stress distributing waterproof medium in joints

1.5.3 Off-Site applications

factory assembled parts (roof trusses, wall sections, laminated beams)
prefabricated houses
saddles and reinforcements
prefab composite bridge sections
decking

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 fiberboard, hardboard) and plywood

1.7 Assembly Operations/Other

1.7.1 Sandwich Panel & Structural Insulated Panels (SIPs)

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, leveling compounds and flooring/tiling adhesives with a content of less than 5% dry or 20% liquid synthetic dispersed polymer (reference Page 3, item 4, for exclusions).

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

2.3.1 Polyolefins (PE, PP, APP) modified polyolefins

2.3.2 Ethylene vinyl acetate (EVA) and its graft adhesive film

2.3.3 Polyamides (PA) and its powder, web film

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
(includes single and 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, Noise Vibration & Harshness (NVH), body sealants, thread locking)

3.2.2 Trucks, Buses, Trailers
(OEM, Noise Vibration & Harshness (NVH), 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, Noise Vibration & Harshness (NVH), private, commercial)

3.2.6 Railway
(including light rail vehicles/mass transit, Noise Vibration & Harshness (NVH), subcomponent fabrication)

3.2.7 Ships
(primarily engine and equipment bedding plus LNG tanks)

3.2.8 Shipping Cargo Containers

3.3 Consumer/Do-It-Yourself (Retail)

3.3.1 Household, Do-It-Yourself
(typical products include sealants and one/two component foam sealants, for retail sale in small packages used in water and air sealing applications)

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, HVAC**[1])

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)

[1] HVAC : **H**eating, **V**entilation, **A**ir 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)

4.9 Other Sealants (not included above)

This can include:

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

END