Elvacite® 4188

Acrylic Resin for Improved Metal Adhesion

Elvacite® 4188 is a solid bead methacrylate copolymer intended for use in solvent based coating systems where improved adhesion to difficult metals is important. Elvacite® 4188 exhibits excellent outdoor durability and resistance to ultraviolet degradation.

The resin may be used in a variety of metal coatings applications such as transportation finishes in automotive, container and other marine coatings, and a variety of brass and aluminum coating applications. It may also be used to coat metallized films such as for hot stamping, etc. Elvacite® 4188 demonstrates excellent adhesion to plastic substrates such as PS, ABS, and PVC.

Performance Features and Key Benefits

- Good adhesion to a variety of substrates including difficult metals like aluminum and galvanized steel
- Exceptional resistance to abrasion and moisture
- Excellent untraviolet and chemical resistance

Typical Properties[a]	
Appearance	Solid bead
Specific Gravity, 25° C	1.13
Glass Transition Temp, onset	61°C
Molecular Weight (Mw)	55,000
Acid Number (mg KOH/g Resin)	10

a) *Typical physical properties listed are approximate values and should not be considered manufacturer's release specifications. Manufacturer's release specifications are subject to change without notice, please contact your Elvacite® representative for the latest product specification details.*

Preparing Solutions

Elvacite® resins dissolve at room temperature but require constant agitation to prevent solvent-swollen granules of polymer from forming agglomerates and sticking to the walls of the vessel. Important: The polymer beads should be sifted directly into the vortex of the stirred solvent to speed wetting-out and dispersion. Continuous low-shear agitation for periods of 1-12 hours, depending on the grade and concentration of resin, is recommended.

After the solution appears clear in the tank, a sample should be spread out on a Leneta card or glass. After the solvent evaporates and a film forms on the card or glass, there should not be any resin seeds. If there are any seeds, the tank should be agitated further to fully dissolve the resin. Tank agitation should not be stopped (except for sampling) until the film test indicates there are no resin seeds. Any cloudiness or residue may indicate that some polymer remains undissolved. The presence of water in the system can also cause cloudiness.

Solution time can be reduced by heating; most common solvents can be heated to approximately 49°C (120°F) without the need for reflux equipment. High-shear agitation also cuts dissolving time, but requires care to avoid overheating and excessive solvent loss.

Solvent Solubility

Table depicts the solubility of Elvacite® 4188 at 30% solids in various solvents.

Solubility of Elvacite® 4188		
Solvent	**Solubility**	**Rating**
Toluene	S	C
Acetone	S	C
Methyl ethyl ketone	S	C
Dimethyl carbonate	S	C
Methyl isobutyl ketone	S	C
n-Butyl acetate	S	C
t-Butyl acetate	S	C
Ethyl acetate	S	C
n-Propyl acetate	S	C
Methyl acetate	S	C
2-propanol	I	-
Low odor mineral spirits	I	-
(S = Soluble, H = Cloudy/hazy solution, C= Clear solution, I = Insoluble)		

Viscosity and Gloss

The table below illustrates typical viscosities of Elvacite® 4188 in varying solvents at 30% solids.

Solvent	Viscosity (cP)	Gloss (60°)
Acetone	22	83
Toluene	51	83
Methyl ethyl ketone	23	-
Dimethyl carbonate	30	-
Methyl isobutyl ketone	41	87
n-Butyl acetate	58	86
Ethyl acetate	24	87
Methyl acetate	22	-
t-Butyl acetate	124	-

Adhesion to Metal

The table below shows results of crosshatch adhesion testing on metal plates. Panels are made by coating a 40% solids solution in n-Butyl acetate using a 5-mil doctor blade. The panels were dried overnight then tested using 1 mm crosshatch cutter and clear adhesive tape.

Elvacite® 4188 on metal	**Cross-hatch adhesion**
Stainless Steel	4B
Steel, Smooth Finish	5B
Steel, Ground	5B
Steel, Tin Plated	5B
Aluminum Chromate, Pretreated	5B
Aluminum, Mill Finish	5B

Cross-hatch adhesion test ASTM- Classification of results

5B = no detachment of film

4B= 5% of film detached

3B = 5 – 15% of film detached

2B = 15 – 35% of film detached

1B = 35 – 65% of film detached

0B = > 65% of film detached

COMPLIANCE WITH FDA REGULATIONS revised April 1, 2019

Pasadena, Texas, USA **Grade: ELVACITE® 4188**

Issue date: December 2019

We, MITSUBISHI CHEMICAL AMERICA, INC., Specialty Resins Division, confirm that Elvacite® 4188 complies with the compositional requirements of the following United States of America's Food and Drug Administration (FDA) regulations.

Elvacite® 4188 is cleared for use under the FDA 21 CFR 175.105 for adhesives used as components of articles intended for use in the packaging, transporting, or holding food.

Elvacite® 4188 is cleared for use under FDA 21 CFR 175.300 in resinous and polymeric coatings used as the food contact surface of articles intended for use in producing, packing, processing, preparing, treating, packaging, transporting, or holding food. The coating in its finished form in which it is to contact food is subject to a restriction on its chloroform soluble extractives.

Compliance with the limitation on extractives can only be demonstrated by tests carried out in the final article.

Elvacite® 4188 is cleared for use under FDA 21 CFR 175.320 in resinous and polymeric coatings for polyolefin films, provided it is intended for repeated food contact use as specified in FDA 21 CFR 175.300(a).
The coating in its finished form in which it is to contact food is subject to a restriction on its chloroform soluble extractives.

Compliance with the limitation on extractives can only be demonstrated by tests carried out in the final article.

Elvacite® 4188 is cleared for use under FDA CFR 176.170 as a component of the uncoated or coated food contact surface of paper and paperboard intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting or holding aqueous and fatty foods.

Compliance with the limitation on extractives can only be demonstrated by tests carried out in the final article.

Elvacite® 4188 is cleared for use under FDA 21 CFR 176.180 as a component of the uncoated or coated food contact surface of paper and paperboard intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding dry food.

Elvacite® 4188 is cleared under FDA 21 CFR 177.1010 as semirigid and rigid acrylic plastics articles intended for use in contact with food. The semirigid and rigid acrylic plastics in the finished form in which they are to contact food are subject to limitation on extractives

Compliance with the limitation on extractives can only be demonstrated by tests carried out on the final article.

This statement of compliance is correct at the date of issue.

As food contact regulations and product formulations are subject to change, it is the users responsibility to ensure that they are in possession of a current statement of compliance.

For further information or samples, please contact your local distributor, or:

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