

Dynasytan® SIVO 160

Water-borne organic inorganic binder and additive for the formulation of metal surface treatment systems

Technical data

Properties and test methods	Value	Unit	Method
Density (20 °C)	approx. 1,025	g/cm ³	DIN 51757
pH value (20 °C / 1:1 in H ₂ O)	approx. 4,0-4,6	-	DIN 19268
Viscosity (20 °C)	approx. 9	mPa·s	DIN 53015
Solid content	8,5 - 9,5	mass-%	3 g/ 2 h 105°C
Flash point	> 95	°C	EN 22719

Registrations

Dynasytan® SIVO 160

EINECS/ELINCS (EU):	Yes
AICS (Australia):	No
DSL/NDSL (Canada):	*
PICCS (Philippines):	*
TSCA (USA):	*
IECSC (P.R. China):	*
ENCS (Japan):	No
ECL (South Korea):	No
* = information on request	

Dynasytan® SIVO 160 is a water-borne storage stable silane based sol-gel system for the formulation of inorganic surface treatment primers.

As part of the SIVO® SOL Technology, it features all the benefits of the other well established products of this series. These are the absence of heavy metals, fluorides, and solvents. It is designed to have a low volatile organic content. Due to its polymeric nature, it is characterized by a high reactivity. This is demonstrated by its extraordinary low curing temperature of 20 to 80 °C which represents a major breakthrough for water-borne sol-gel systems. Dynasytan® SIVO 160 is a clear to slightly opaque, colorless to slightly yellow, low viscosity liquid.

Safety and handling

Before considering the use of Dynasytan® products please read its Safety Data Sheet (SDS) thoroughly for safety and toxicological data as well as for information on proper transportation, storage and use. The Safety Data Sheet is available after registration on our website www.dynasytan.com or upon request from your local representative, customer service or from Evonik Operations GmbH, Product Safety Department, E-MAIL sds-hu@evonik.com.

Packaging, storage and shelf life

Dynasytan® SIVO 160 is supplied in 25 kg PE drums, 200 kg PE-inlined steel drums, and 1.000 kg containers (IBC).

Due to its water content Dynasytan® SIVO 160 must be stored above freezing. Storage temperature must not exceed 40 °C.

In sealed containers Dynasytan® SIVO 160 has a shelf life of min. 12 months from delivery.

Properties and applications

Dynasylan® SIVO 160 can be used to formulate new conversion coatings for metal surfaces. Formulations of the product can advantageously be used on glass, ceramics, stainless steel, HDG steel, zinc, aluminum, and magnesium.

Because of its bi-functional nature Dynasylan® SIVO 160 finds its use as an additive to formulate primers and wash-coats as conversion layers, sealers or adhesion promotion primers on metal, glass, or ceramic surfaces. The product binds strongly to the metal through the reactive silanol groups of the molecule while being able to interact with a great variety of organic resins with its organofunctional groups. The performance of Dynasylan® 160 can be optimized by special formulations with other water-borne sol-gel systems or additives.

The molecular weight of the molecule has been especially tailored for optimized wetting properties, thus a homogeneous surface layer is formed on the substrate.

Dynasylan® SIVO 160 is a base resin/primer and often needs to be formulated for optimized performance in different applications methods and large scale processes.

Dynasylan® SIVO 160 containing formulations can be sprayed, dipped, or applied with a doctor blade. The layer thickness depends on the formulation, the application and has to be evaluated.

The following examples show the potential of Dynasylan® SIVO 160 which was used without further optimization.

A typical adhesion promotion formulation for Dynasylan® SIVO 160 contains 10 % Dynasylan® SIVO 160 and 90 % water. This is applied onto the surface of alkaline cleaned and acid treated aluminum. Thereafter a polyester powder coating 60µ is applied.

Dynasylan® SIVO 160 is predominantly suited as a binder or additive for low temperature curing (20 to 80 °C) sol-gel and sol-gel-based hybrid coatings. Dynasylan® SIVO 160 is a polymeric silane with reactive groups.

Due to its high degree of polymerization and its high reactivity it has the following advantages:

1. Water-borne
2. Low VOC (volatile organic content)
3. Heavy-metal and fluoride free
4. Forms very thin, highly crosslinked layers (< 1 µm)
5. Resistant against boiling water and alkaline aqueous solutions
6. Thermally stable up to 220 °C

Reactivity

Dynasylan® SIVO 160 is a water-borne sol-gel system which does not contain organic solvents. It does not release alcohols upon hydrolysis, contrary to standard functional alkoxysilanes. Dynasylan® SIVO 160 has a highly branched structure and contains a high concentration of active silanol groups. Therefore it can chemically bond to surfaces of suitable substrates and achieves a high degree of crosslinking by formation of 2- and 3- dimensional siloxane networks. Due to the high crosslinking density, an exceptional hardness can be achieved. On smooth surfaces, a layer thickness of more than 1 µm results in a brittle coating and should be avoided. On rough substrates thicker layers are possible without brittleness. If a higher layer thickness is necessary, formulations of Dynasylan® SIVO 160 with other sol-gel systems such as Dynasylan® SIVO 110, polymers, or polymer dispersions can be made.

Suitable substrates: stainless steel, HDG steel, Zn-galvanized steel, aluminum, magnesium, glass, ceramics.

The final curing temperature of Dynasylan® SIVO 160 depends on substrate and possibly the top-coat if the product is used as primer. In some cases Dynasylan® SIVO 160 based formulations can be dried at room temperature. In combination with a top-coat, a curing temperature of 60 to 80 °C is recommended for the final cure.

Processing

Dynasylan® SIVO 160 can be mixed with deionized water in any proportion. Dilution in common organic solvents such as ethanol, iso-propanol, butyl glycol, or methoxypropanol is possible. To prepare an adhesion promotion primer solution, Dynasylan® SIVO 160 is typically diluted 10 % in deionized water. It can also be formulated with water-thinnable binders and other additives such as Tego® Wet 280 (wetting agent). The compatibility of formulations depends also on the pH value as Dynasylan® SIVO 160 is only stable in an acidic pH area.

As part of the SIVO® SOL Technology, Dynasylan® SIVO 160 can be formulated with other components of this technology. For instance, the addition of Dynasylan® SIVO 160 to the inorganic binder Dynasylan® SIVO 110 results in mixed inorganic binder formulations which allows for the formulation of thicker coatings that cure at lower temperatures than Dynasylan® SIVO 110 alone.

As another example, Dynasylan® SIVO 112 can be added in amounts of 2-50 % to Dynasylan® SIVO 160 to achieve very thin easy-to-clean coatings.

Dynasylan® SIVO 160 is not stable in formulations which contain fluoride. Dynasylan® SIVO 160 must be protected against freezing temperatures.

Due to the high reactivity of Dynasylan® SIVO 160 droplets of the product at the top of the packaging (PE pails or steel drums with PE-inliner) can react when the water of the droplet evaporates and small gel particles are formed. Therefore, a simple filtration before the application or formulation of Dynasylan® SIVO 160 is recommended.

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