

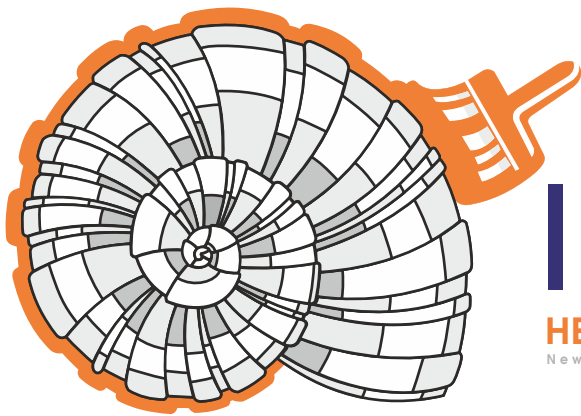
ISO at™

HEAT INSULATION OF ANY SURFACE

New Generation Liquid Heat Insulation and Fire Protection Coating

THERMOS LIQUID COATING

USAGE HEAT: -60°C / +1200°C



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**SPECIAL TECHNOLOGIES LLC**

Manufacturer Company / Russian Federation
&

NOTERSON LTD. ŞTİ.

Turkey Distributor

FUTURE TECHNOLOGY NEW GENERATION LIQUID HEAT INSULATION AND FIRE PROTECTION MATERIALS

Liquid ceramic insulation material Isollat is a nano-technology insulation material that is developed in 2002 by SPECIAL TECHNOLOGIES LLC in the Russian Federation with the assistance and incentive of the Russian Academy of Sciences High-Heat Electrochemistry Institute and Military industry complex.

Isollat is an insulation coating that is used in industrial facilities, metal pipelines and their connections, heat producing facilities, building interior and exterior facades, tanks, vehicles and ships and many other areas for insulation purposes.

It is a new generation insulation material that is developed to provide HEAT, SOUND, CORROSION and FIRE isolation in one-time application.

ISOLLAT is one and only insulation in ceramic spherical liquid materials sector that has wide temperature working band -60°C / $+700^{\circ}\text{C}$ (peak point is 800°C). Which makes ISOLLAT first and only product in the world in this field.

We; as Turkey distributor of ISOLLAT, solve insulation issues in every field with engineering solution by ISOLLAT products.

WHAT IS ISOLLAT (Thermos Liquid Thermal Insulation Coating)?

ISOLLAT is a new generation Nano-technology material for particularly heat insulation and general isolation purposes. In thermal insulation material consisting of a mixture of vacuum ceramic and silicate spheres and a binding liquid polymeric structure.

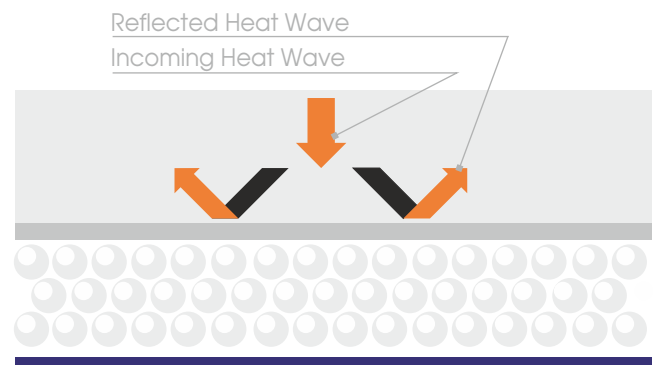
Liquid ceramic thermal insulation is resistant against fires and impact ; It is a light and flexible new generation polymer coating material that reduces heat transfer to an optimum.

The liquid polymer structure provides a high level of flexibility and adhesion to any material surface coated with different geometric shapes. The low thermal conductivity of the coating allows for not only heat protection. Also from solar radiation (reflects 90% of the radiation), rust, humidity and condensation.

ISOLLAT is insensitive to temperature and humidity changes and sufficiently resistant to basic corrosion. In a single application of very thin thermal insulating coat of ISOLLAT. Protect all equipment from HEAT ,SOUND, CORROSION AND FIRE.

ISOLLAT COATING FEATURES

- Provide high amount of energy savings
- Due to its excellent reflective and radiating properties, ISOLLAT is very effective in preventing radiant energy permeability in isolated structures and equipment. 90% of the energy in contact with the product. That is reflected or redistributed.
- Easy Application (ISOLLAT can be easily applied with a brush or paint gun, just like paint)
- The operating temperature scale is between -60°C / $+700^{\circ}\text{C}$ (peak at $+800^{\circ}\text{C}$). It is the one and only liquid ceramic spherical insulation material in the world.
- Eco- friendly and it does not contain substances harmful to human health. It is safe and does not contain chlorides, organic volatiles and heavy metals.
- Extremely light and flexible. It can expand and contract with the applied surface.
- Very low application thickness
- Operating costs are reduced in the implemented projects.
- Long life without loss of efficiency during operation – with a minimum 20 years at high temperatures, at least 30 years at low temperatures
- Vibration resistant
- Preventative sound and vibration
- Prevents or eliminates possible condensation on the applied surface.
- High corrosion protection, resistant to humidity and temperature changes
- ISOLLAT nominal heat conductivity: $0.002\text{--}0.007\text{ W / m}^{\circ}\text{C}$, (at least 20 times less than other products)



For other advantages and features, please see www.isollat.ae



APPLICATION AREAS

ISOLLAT has a wide area of usage in the isolation industry. Generalized as ;

- For thermal insulation of hot water, steam boiler systems and pipes, valves and all other connection equipment;
- To minimize the operating costs that are caused by heat loss in industrial plants and buildings.
- In order to prevent cold and heat losses in indoor and outdoor surfaces,
- For heat, sound, corrosion and condensation protection of air , land and marine vehicles.
- To provide sound, corrosion and condensation isolation in buildings and industrial plants.

Industrial insulation applications	Building-Construction isolation applications	Vehicle isolation applications
Steam, Hot water pipes	Cold storage	Ceilings of the refrigerated vehicles
Ventilation pipes, HVAC lines	Roof windows	Race cars fire safety walls
Solution tanks and pipes	Building roofs and walls	Student vehicles
Hot oil tanks and lines	Roof Sealing	Coach and vehicle isolation
LNG / LPG / gasoline / diesel tanks	Silos	Caravans
Fasteners (angle connectors, valves, etc.)	Metal buildings	Exhaust system parts
Boilers, Heat Exchangers (other exchangers)	Glass buildings	Walls and ceilings of trailers
Fermentation tanks and equipment	Chicken farms	Interior walls pf planes
Oxygen and Nitrogen Tanks and Equipment	Horse farms and training grounds	Ship decks and exhaust pipes
Oil pipelines (underground - above ground)	Metal railings	Ceilings for live broadcasting vehicles
Water tankers. Rotary Calcination Furnaces	Hangars	Tankers
Cement and Nitrogen Storage Tanks	Garages	Fishing boats
Chemical hot mixing tanks	Military facilities	Lobster boots
Oil separators. Cyclone, Fire room.	Exposed fire hydrants	Interior parts for railroad cars
All types of industrial valves	Industrial Chimneys	Mobile fuel tanks
Refinery equipment	Plumbing pipes and fittings storage	Air vehicle equipment
Steam and Oil Boilers Industrial Furnaces	Aerospace Defense	Chemical tanks
External outline pipes	Building surfaces	Military armored vehicles
Oil and natural gas production and equipment	Refrigerator and Freezer System Equipment	Mobile refrigerators and heaters
Medium and High-Pressure Steam Lines	Historical monument restoration	Unmanned aerial vehicles
Heat recovery units	Steel structures	Automotive manufacturing sector
Agriculture and food industries	Station, warehouse, workshop areas	Food transport vehicles

PRODUCTION

ISOLLAT liquid ceramic insulation coating is produced in 5, 10- and 19-liter packages.

ISOLLAT LIQUID COATING PRODUCTS



ISOLLAT 01 – BUILDING AND CONSTRUCTION

Construction, building liquid thermal insulation is used in exterior and interior thermal insulation of buildings. This product protects the building against sun in summer and cold in winter on the applied surfaces. Due to the diffusion transition properties, the buildings respire. Flammability Group: Class B1 (Not easily flammable)



ISOLLAT 05 – 120 MINUTES FIRE PROOF

It is a fire protection coating for steel constructions. Fire resistance belongs to the 5th group (120 minutes) (In accordance with the 236- 97 Fire Safety Norms (NPB)) It has high flexibility, it is resistant to impacts and vibrations, it also has the ability to withstand long term vibration and stress. This product is unique among the fire-retardant materials produced in the world.



ISOLLAT 02 - UNIVERSAL

It is a thermal insulation material having minimum thermal conductivity coefficient and wide temperature band. The operating temperature reaches + 150 ° C (+170 ° C in peak mode). It is used for coating and heat insulation of pipelines, industrial plants, boilers and storage equipment. Flammability Group - Class B1 (Not easily flammable)



ISOLLAT NANO - HISTORIC WORKS and RESTORATION

ISOLLAT Nano provides optimum thermal insulation by cleaning the organic components formed by the effect of ultraviolet light and humidity. Due to the hydrogen peroxide in the interior and exterior thermal insulation content which has photo catalysis effect. It is used in restoration and thermal insulation applications of buildings and historical monuments. Flammability Group - Class B1 (Not easily flammable)



ISOLLAT 03 – CONTAINING FIRE PROTECTION

It is a special insulation material reinforced with flame retardant additive which is used for facilities which are important for fire safety. The operating temperature reaches + 150 ° C (+ 170 ° C in peak mode). Does not support combustion process.



AEROLLAT LIQUID THERMAL INSULATION COATING

It is an liquid thermal insulation material that contains aerogel particulars and is applied on every surface. It has low heat conductivity. The working temperature is -60 C/ +170C. It belongs to B1, flammability group (does not fire)



ISOLLAT 04 - HIGH TEMPERATURE

It is an organic based material. It is used for coating pipelines and high temperature technological equipment. It is the world's only patented insulation material with a bandwidth of -60 ° C / + 700 ° C (+ 800 ° C in peak mode) (ISOLLAT effectively reaches + 1200 ° C if various combined materials are used). Flammability Group Class -A (Inflammable)



ISOLLAT – Effective (-60 / + 1400 ° C)

It is a combined thermal insulation system applied in industrial equipment and pipelines with high body temperature (ISOLLAT-02 and ISOLLAT-04 brands are used in various combinations.) Generally ISOLLAT-Effective provides 30-40% heat saving in 1 m²

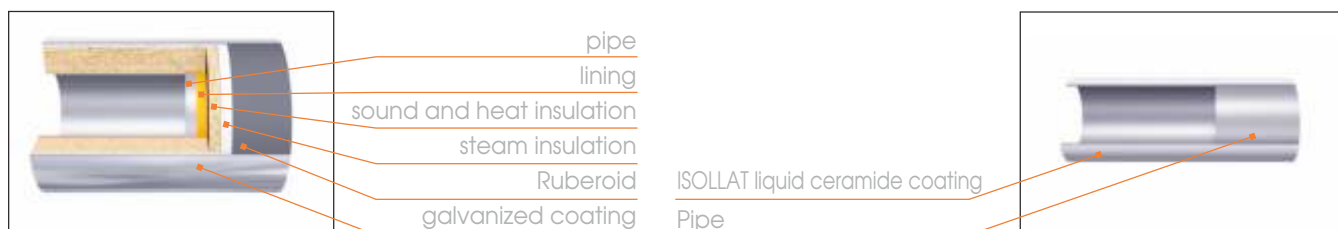
MECHANICAL AND PHYSICAL PROPERTIES OF ISOLLAT COATING

(GOST - State Committee of the Russian Federation for Standardization)

Liquid Density, kG / dm³ ISOLLAT-01, ISOLLAT-Nano ISOLLAT-02, ISOLLAT-M ISOLLAT-03 ISOLLAT-04	0,60 0,50 0,75 0,95	GOST 28513 - 90
Final coating density, kG / dm³ ISOLLAT-01, ISOLLAT-Nano ISOLLAT-02, ISOLLAT-M ISOLLAT-03 ISOLLAT-04	0,40 0,30 0,55 0,70	GOST 17177 - 94
Vapor permeability, mg / m²h ISOLLAT-02	0,012	GOST 12086 - 2008
Water permeability, Gram / m² 24 hours ISOLLAT-02	Less than 30	
Visible viscosity of Brukfild (Rotor R4, 10 rpm), cP ISOLLAT-01, ISOLLAT-02, ISOLLAT-03, ISOLLAT-04 ISOLLAT-Nano ISOLLAT-M	12000 - 16000 29000 - 33000	GOST 25271 - 93
One layer Liquid coating (0.5 mm) mass, kg / m² ISOLLAT-01 ISOLLAT-02 ISOLLAT-03 ISOLLAT-04	0,3 0,25 0,375 0,625	
Rupture Strength kgf/cm²	80	
Rupture extension percentage ISOLLAT-01, ISOLLAT-02, ISOLLAT-03, ISOLLAT-04, ISOLLAT-Nano, ISOLLAT-M	5	
Light reflection, %	90 %	
Light Diffusion (IR light), %	95 %	
Nominal thermal conductivity, W / m°C	0,002 - 0,007 (contact free usage)	
Heat loss reduction rate of 1 mm coating thickness, % ISOLLAT-02	% 293	Engineering center "Sroytest SiBADI", city Omsk
Adhesion Metal: Concrete:	1 point 25 kg/cm ²	GOST 15140-78 GOST 28574-90
Life	15 years	Test laboratory of the Ural Department of the Russian Academy of Sciences. City Perm
Freezing and thawing resistance, freezing at -50 ° C, thawing at +20 ° C	10 cycles	GOST 27037-86

COMPARISON OF ISOLLAT LIQUID HEAT INSULATION COATING AND CLASSIC INSULATION MATERIALS

Compared to classic insulation materials used in industrial plants, residence and vehicle manufacturing sectors. ISOLLAT materials has been found to be different and more advantageous in terms of many feature. Insulation thermal conductivity value, application conditions, service life, material & labor cost, ecological conditions and other properties. Detailed explanation is as follows:



MATERIAL	ISOLLAT	ISOLLAT-EFFECTIVE	MINERAL WOOL	POLYURETHANE ISOLATION MATERIALS	POROUS RUBBER MATERIALS
Thermal Conductivity	0,002 to 0,007	0,027	0,05-0,07 (increases 2.8 times during its run time)	0,035 to 0,045	0,035 to 0,04
Density, kG / dm ³	280	160-180	150-200	30-50	65-80
Vapor permeability mg / m ² · h	0,012	0,012	0,03 to 0,03	0,4-0,2	0,0001
Water permeability, Gram / m ² / 24 hours	Less than 30	Less than 30	1000-2000	100-300	Less than 30
Lifetime (years)	min 30 years at low temperatures, min 20 yrs at higs temperatures	min 30 years at low temperatures, min 20 yrs at higs temperatures	2-5 Years	2-5 Years	2-3 Years
Isolation Thickness (mm)	0,5 - 3 mm	10 - 40 mm	50 - 300 mm	40 - 60 mm	20 mm
Application disadvantages	Misapplication	Misapplication	Temperature and humidity neglect	Temperature abuse, UV ray effect	Temperature and humidity neglect (More than 105 ° C)
Continuous Operating Temperature	t ≤ 170 ° C	t ≤ 1200 ° C	t ≤ 450 ° C	t ≤ 130 ° C	t ≤ 100 ° C
Ecological compatibility	Not harmful to human health.	Not harmful to human health.	It produces 0.02 mg of formaldehyde and fiber powder per hour at 1 m ² .	Up to 130 ° C is not harmful to human health	Not harmful to human health.
Assembly complexity	low	middle	high	high	middle
Labor intensity, Labor time	2,62	2,33	9,66	7,06	6,02

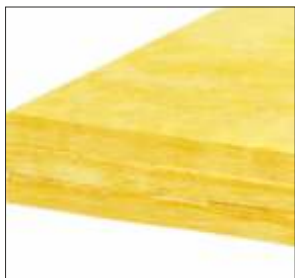
(This comparison ISOLLAT, ISOLLAT-Effective material and classic insulation materials were tested at 95 ° C in 1-meter metal pipe with 108 mm diameter)

MATERIALS USED IN HEAT INSULATION ACCORDING TO FLUID TEMPERATURE IN INSTALLATIONS

COLD LINES -60 - + 10 ° C	WARM LINES 10 -100 ° C	HOT LINES 100 - 1200 ° C
Polythene	Polythene	Glass Wool
Rubber	Rubber	Rock Wool
	Fiberglass	Ceramic Wool
ISOLLAT - 60 ° C / 700 ° C (Peak 800 ° C)	ISOLLAT - 60 ° C / 700 ° C (Peak 800 ° C)	ISOLLAT - 60 ° C / 700 ° C (Peak 800 ° C)

DISADVANTAGES OF TRADITIONAL HEAT INSULATION MATERIALS

Common disadvantages of all the conventional insulation materials that are mentioned below in detail ; complex structures in application, short service times and insufficiency in providing thermal insulation of surfaces.



MINERAL WOOL

Mineral wool is the most popular insulation product produced by dozens of factories in hundreds of different varieties.

The common feature of all mineral wool boards is the use of basalt and resin binder based mineral fibers. When used in accordance with its requirements, mineral wool is a really useful and durable insulating material. However practically, it is almost impossible to follow the recommendations of all factories. Mineral wool loses

approximately 40% of its properties at the end of the first year of thermal insulation application. The material becomes wrinkled and swells due to the effect of water, steam or humidity and then the problem called "cold bridge" occurs.

Mineral wool cannot provide full adhesion to the insulation surface. (Hot air transitions can be seen between the surface and the insulation layer.) In the course of time, this fact becomes even more important, and over time, the heat transfer increases and the heat efficiency decreases to a minimum.

If mineral wool boards are used for objects with high moisture content the heat transmission coefficient of this material grows significantly. For a material with a density of 74 kg / m^2 , heat conduction increases by a factor 2.8, for a density of 156 kg / m^2 increases by a factor of 1.9. Effect of wind should be taken into account speed up to 0.7 m / sec , mineral wool heat conduction coefficient increases by 60% further.

In addition, using mineral wool causes environmental damages. Formaldehyde and phenol in mineral wool are very dangerous for health. Formaldehyde resins contain carcinogenic substances. Phenol accumulation in the human body causes diseases of respiratory system, skin diseases and weakens reproductive function and also contributes to cancer. 1 m^2 of mineral wool coated surfaces form 0.02 mg of formaldehyde per hour. Mineral wool is presented by manufacturers as inflammable material. In actuality, phenol vapor and formaldehyde emitted by mineral wool will cause more damage to people.



POLYURETHANE FOAM

The most significant disadvantage of polyurethane insulation material is very sensitive to UV rays, which reduces the service life up to 2-3 years. For this material almost impossible to find a good UV protection. The operating temperature should not exceed 130°C . (150°C is allowed for short-term operations)

In heating and hot water systems, temperature decreases industrial pipelines, affect the performance of polyurethane. In this material starts to develop halogenous ions with a permanent corrosive effect in the metal pipe. If polyurethane insulation is used, the pipes need additional hydro protection. Polyurethane foam installation for pipelines the process of installation is very labor intensive especially for the isolation of additional parts.

During the polyurethane combustion process (or overheating), large carbon monoxide and acid vapor released. If PU foam does not contain fire prevention agents, the fire will cause a high rate of increase in harmful substances.



POROUS RUBBER MATERIAL

Despite the ease of use of porous rubber, the service life of this material is extremely short. This material starts to lose insulation property at 90°C . Continuous temperature changes cause the porous rubber material to expire as early as 2-3 years.



WHAT IS AEROLLAT ?

It is a new generation liquid thermal insulation material that contains aerogel particulars in large amounts and is polymerized with water which is applied on every surface.

Aerolat, which can be applied as a paint on all kinds of difficult and different geometric surfaces, creates an extremely high thermal insulation coating as polymerization after drying

Heat loss rate is reduced 6-8 times on the insulated surfaces after the application of aerolat.

CHEMICAL STRUCTURE OF AEROLLAT

It is the aerogel (nanogel) granules that ensure the high thermal insulation features of aerolat coating. Aerogel is the lightest material in the World. It consists of 99.8 % air and it has both low density and thermal conductivity at record level. Moreover, hardness, transparency and heat resistance are distinguishing features.

Chemical structure of aerogel consists of integrated molecular structures formed by air filled groups (clusters) and pores as homogeneous 2-5 nanometer particle-sized. The pores of the structure in the form of aerogel spherical clusters that have nearly 0.004 microns in a three-dimensional network are filled with air (99 %). (Nano is a metric abbreviation that means nano; nanometer (nm) means nano of a meter).

Aerogel prevents the heat with convection and conduction method via its solid three-dimensional advanced network structure in the size of several nanometers.

FIRE PROTECTION

ISOLLAT- 05 FIRE PROTECTION PAINT (INTEGRATED PAINT)

ISOLLAT-05 fire protection paint expands to 100-120 times its volume in contact with fire to form penokoks (a layer that is swollen and porous) and provides optimum protection against fire and extreme temperature for 120 minutes.

It is a water based vinyl acetate fire delaying paint. Eco-friendly, flexible, reliable in case of explosion and fire and can be used indoor and outdoor areas. It is a new generation fire protection paint.

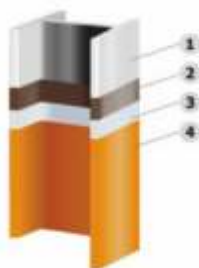
Application Areas

Can be used in all areas that contain steel construction, cable ducts and cables, fire ladders, fire sensitive equipment, fire doors and other fire risk areas.

Application Methods

Brush, air gun, airless spray gun, roller

Fire Delaying Coating "Before" and "After" Fire



1. Metal
2. Primer
3. Fire Delaying Coating
4. Final Layer (If Necessary)



1. Metal
2. Penokoks
(heat insulation layer)

CONSTRUCTION LIQUID THERMAL INSULATION APPLICATIONS



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INDUSTRIAL LIQUID THERMAL INSULATION APPLICATIONS



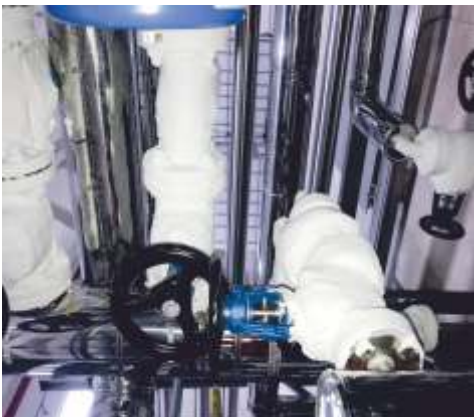
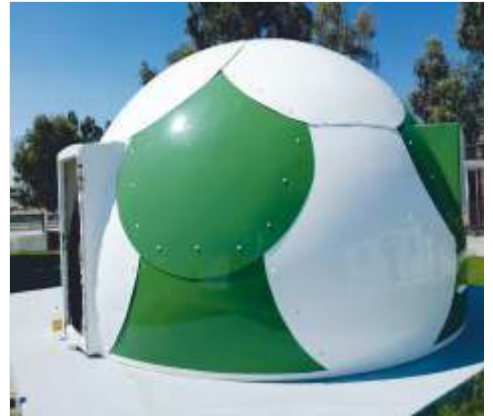
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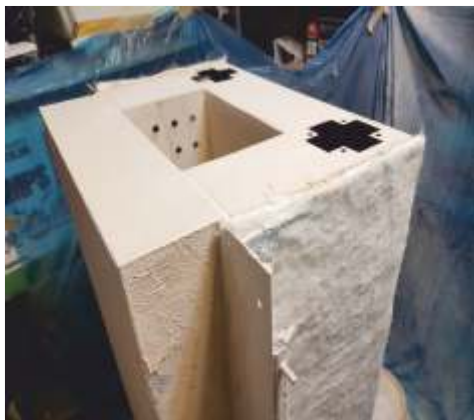
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GENERAL APPLICATION INSTRUCTIONS

(storage, transportation and application)

1. STORAGE AND TRANSPORTATION

Storage and transportation of ISOLLAT-01, 02, 03, 04 and 05 brand liquid thermal insulation ceramic coating and fire protection paint should be conducted in a cool but not cold environment using a hermetically sealed container. Environment temperature should not be less than + 5 ° C.

2. PREPARATIONS FOR COATING BEFORE APPLICATION

The liquid coating contains vacuum spheres that are filled with air. These spheres rise towards the top of the bucket, while the coating liquid remains at the bottom of the bucket.

Before the application or after break, ISOLLAT liquid ceramic coating should be mixed until it becomes homogenous. It is recommended to mix the ISOLLAT coating with the mixer at a between speed 100-1500 rpm.

Mixing should be done by moving the mixer up, down, right and left at different angles. These movements should continue until ISOLLAT becomes homogeneous with a cream-like consistency.

Attention:

* It is not recommended to add more than 10% water to prevent unwanted changes in ISOLLAT coating.

* When the bucket waiting for a long time on the shelf is opened first, it is normal that the material in the top layer is very solid. It will be homogeneous when mixed.

3. SURFACE PREPARATIONS BEFORE APPLICATION

In order for ISOLLAT liquid coating to be durable and long lasting, the surface must be cleaned from oil, excessive rust and dirt with chemical solvents or rasping method (metal brush, scraper, sanding, sandpaper).

Caution: ISOLLAT liquid coating operation application surface temperature should be between + 5 ° C and + 120 ° C. In addition, the surface temperature must be equal to or higher than the ambient temperature.

4. ISOLLAT LIQUID COATING APPLICATION PROCESS

Application with Paint Brush

Before the ISOLLAT coating primer execution, the paint brush should be washed and the excess water shaken. In the following process, the paint brush should be re-wetted if it dries. The wetting of the paintbrush is for easy application of the coating on hot surfaces.

Airless (Airless Gun) Application

Application should be executed at 40-100 bar operating pressure with the help of high-pressure airless gun. During the execution with spray gun, the applicable operating pressure should be used as low as possible in order to prevent deterioration of the layers.

After the process, the paint brush and spray gun should be washed carefully with water.

ISOLLAT coating can be applied in 2-6 layers depending on the temperature. A layer thickness is 0.3-0.5 mm.

NOTE: The thickness and consumption of the layers can vary depending on the condition of the surface, the experience of the personnel applying it and the technical parameters of the equipment.

Air Gun Application

It can be applied with 6-8 Bar operating pressure and 4 nozzles. Spray can also be applied with the help of air gun.

Drying Time for Coating

The complete drying period of time for ISOLLAT-01, 02, 03, 04 and 05 coatings vary depending on the humidity in the air at an average temperature of + 20 ° C. Drying time is maximum 6 hours at 50% relative air humidity.

If the relative humidity is more than 50%, the drying time becomes 12 hours.

At an environmental temperature of more than +40 ° C, the drying time of the coating can be reduced by 2 additional hours.

REFERENCES

You can follow all detailed and up-to-date information about ISOLLAT material at the web page of www.isollat.com

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