MasterSeal 6391

Epoxy system with high chemical and mechanical resistance certified for food contact.

MATERIAL DESCRIPTION

MasterSeal 6391 is an epoxy system based on MasterSeal M 391, two-component with a glossy finish (formulated for contact with food according to the EU Regulation No. 10/2011 of the Commission of 14/1/2011) and relative specific primer MasterSeal P 385.
MasterSeal 6391 is available in the colors:

- yellow, specific for contact with wine;
- white (and light blue) specific for contact with drinking water, oil, cereals, and other food substances.

FIELDS OF APPLICATION

MasterSeal 6391 is mainly indicated for the protection of wine vessels, tanks for containing oil, drinking water and for all foods provided for by EU Regulation no. 10/2011 of the Commission of 14/1/2011. Given its high chemical resistance compared to a large variety of aggressive chemicals, it is also suitable for the protection of industrial tanks.

FEATURES AND BENEFITS

MasterSeal 6391 has the following peculiar characteristics;

- formulated according to the "positive list" provided for by EU Regulation no. 10/2011;
- complies with the acceptance limits provided for by Ministerial Decree 21/3/1973 and subsequent amendments and certificate for migration tests with simulants of type A, B, C, D1, 3, D2 provided for by EU Regulation no. Commission of 14/1/2011:

		MasterSeal M 391 color
Ethanol 10%	A	Yellow
Acetic acid 3%	B	Yellow
Ethanol 20%	C	Yellow
Ethanol 50% (up to 96)	D1	Yellow
2,6 diphenyl-p-tenylene polyoxide (dry food substances)	E	Light blue and white
Vegetable oil	D2	Light blue and white
Drinking water	--	Light blue and white

- complies with the limits and restrictions set by EC Regulation No. 1895/2005 relating to the restriction of the use of some epoxy derivatives intended to come into contact with food (prohibition of "BFDGE" and "NOGE" and compliance with specific migration of the "BADGE");
- certified according to Ministerial Decree 174 6/4/2004 (Regulation concerning materials and objects that can be used in fixed systems for the collection, treatment, adduction and distribution of water intended for human consumption);
- complies with the principles defined in UNI EN 1504/2 ("Concrete surface protection systems") and the relative acceptance limits;
- not solvent based.

In compliance with the European Regulation (EU No 305/2011 and EU No. 574/2014) the product is provided with the CE marking according to UNI EN 1504-2 and the relative DoP (Declaration of Performance).

CE
1305
EN 1504-2
Surface protection system for concrete

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PACKAGING

MasterSeal P 385	Packaging	Kg
Comp. A	Tin	4,5
Comp. B	Tin	4,5
Comp. C	Bag	15
Comp. D	Bag	25
Kit “ABC” (0,3 - 1 mm)	1 Can A + 1 Can B + 1 bag C	24
Kit “AB2D” (2 – 40 mm)	1 Can Comp. A + 1 Can Comp. B + 2 bags Comp. D	590

Product	Component	Packaging	Kg
MasterSeal M 391 **Yellow**	A yellow	Tin	25
	B	Tin	25
	2A+B	2 Milk of A + 1	75

Product	Component	Packaging	Kg
MasterSeal M 391 **blue**	A blue	Tin	16
	B	Tin	4.2
	A+B	2 Milk of A + 1	20.2

Product	Component	Packaging	Kg
MasterSeal M 391 White	A white	Tin	16
	B	Tin	4.2
	A+B	2 Milk of A + 1	20.2

STORAGE

Store the product in a sheltered, dry place at a temperature anywhere between +5°C and +30°C.

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System Build Up 1. Products and consumptions. Support to be repaired.		kg/m²
MasterSeal P 385 D	Fast drying concrete repair from 2 to 40 mm	1,7 / mm (min 2 mm)
MasterSeal P 385 ABC (A+B+C)	Primer for ceramic and / or resinous substrates Primer for negative hydraulic thrust Primer resistant to osmotic pressure	1,5
MasterSeal M 391	Vitrifying	0,6
System Build Up 2. Products and consumptions. Resin or mixed substrate (concrete / resin).		
MasterSeal P 385 AB2D (A+B+2D)	Epoxy cementitious repair mortar from 2 to 40 mm also acting as a primer, for damp substrates, resinous or mixed substrates (concrete / resin)	1,7 / mm (min 2 mm)
MasterSeal M 391	Vitrifying	0,6
System Build Up 3. Products and consumptions. Resin or mixed substrate (concrete / resin).		
MasterSeal M 391	Vitrifying	0,6

Essential characteristic in accordance to UNI EN 1504/2 (2 mm).				Limits and class	Performances
Adhesion	In the absence of thermal cycles		UNI EN 1542 on substrate MC (0,40) EN 1766	> 0.8 MPa	> 3 MPa
	After 50 freeze / thaw cycles with UNI EN 13687/1 de-icing salts			> 0.8 MPa	> 3 MPa
	After storm cycles UNI EN 13687/2			> 0.8 MPa	> 3 MPa
Permeability	To Water vapour	UNI EN ISO 7783/1. Equivalent air thickness Sd, Sd = μ s, μ = coefficient Vapor diff., S = thickness		Class I: Sd < 5 m (Permeable) Class II: Sd ≥ 5 e ≤ 50 m Class III: Sd > 50 m (Non Perm.)	Class III
	to CO_2	UNI EN 1062/6. Equivalent thickness of air Sd, Sd = μ · s, μ = coeff. Diff. CO_2		Sd > 50 m	Sd > 50 m
	To water	For capillary absorption EN 1062/3		< 0,1 kg·m^{-2}·h$^{-0,5}$	< 0,1 kg·m^{-2}·h$^{-0,5}$
Mechanical resistance	Impact	UNI EN ISO 6272		Class I: 4 N·m, Class II: 10 N·m Class III: 20 N·m	Class II
	Abrasion	UNI EN ISO 5470/1 (1000 g grindstone H22/1000 cycles)		Weight loss < 3000 mg	< 100 mg
UV resistance	Aging under artificial atmospheric agents (2000 hours of UV rays and condensation), UNI EN 1062/11			No swelling, cracks or flaking	No swelling, cracks or flaking

Essential characteristic in accordance to hydraulic pressure	Limits and class	Performances
Positive hydraulic pressure resistance, UNI EN 12390/8 (5 bar)	Guidelines Cons. Sup. LL.PP Average penetration <20 mm Penetration maximum <50 mm	 < 20 mm < 50 mm
Resistance to negative hydraulic pressure, UNI 8298/8	0 to 2,5 bar	2,5 bar

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CHEMICAL TABLE: CHEMICAL AGGRESSIVE AND RELATIVE GROUP UNI EN13529

Aggressive chemical	Liquid group UNI EN 13529	Aggressive chemical	Liquid group UNI EN 13529
1,2-dichloroethane	6	Acetic anhydride	7
Acetaldehyde	7	Maleic anhydride	7
Amyl acetate	7	Aniline	13
Ethyl acetate	7	Antifreeze (ethylene glycol)	5
Acetophenone	7a	Benzene	4a
Acetone	7	Petrol, diesel and hydrocarbons	4
Acetic acid	9	Biodiesel (transesterified lipids)	7b
Acrylic acid	9a	Butanol	5
Adipic acid	9a	Caprolactam (amide)	7
Benzoic acid	9a	Jet fuel	2
Boric acid	10	Kerosene	2
Citric acid	9a	Cyclohexane	4
Hydrochloric acid	10	Chloroform	6a
Chloroacetic acid	9	Benzoyl chloride	6b
Chromic acid	10	Calcium chloride	12
Decanoic acid (capric)	9a	Sodium chloride	12
Heptanoic acid	9a	Cresoli	9
Aluminum sulphate	10	Detergents (acids)	10
Fumaric acid	9a	Phosphoric acid	10
Gallic acid	9a	Dichloromethane(methylenchloride)	6a
Glycolic acid	9a	Dimethylformamide	7
Lactic acid	9	Hexane	4
Lauric acid	9a	Ethanol	5
Maleic acid	9a	Phenol	9
Malic acid	9a	Formaldehyde (formalin)	8
Methacrylic acid	9a	Ethyl acetate glycol	7
Nitric acid	10	Diethylene glycol	5
Oleic acid	9a	Ethylene glycol	5
Oxalic acid	9	Propylene glycol	5
Picric acid	9	Fat	4b
Salicylic acid	9a	Calcium hydroxide	11
Sulfuric acid	10	Potassium hydroxide	11
Stearic acid	9a	Sodium hydroxide	11
Tartaric acid	9	Isopropanol (2-propanol)	5
Thioglycolic acid	9a	Milk	9
Trichloroacetic acid	9a	Brake fluid (polyglycols)	5
Aqua regia	10	Methyl methacrylate	7
Denatured alcohol	4	Methanol	5a
Monochlorobenzene	6b	Methylethylketone	7
N, N-dimethylacetamide	7	Ammonium sulfate	10
Ammonium nitrate	12	Copper (II) sulphate	12
Magnesium nitrate	12	Carbon sulfide	15 a
N-methyl-2-pyrrolidone	13	Styrene	4
Oleum (fuming sulfuric acid)	10	Tetrachlorethylen (perchlorethylene)	6
Mineral oils	3	Carbon tetrachloride	6a
Vegetable oils	4	Tetrahydrofuran	15
Raw oil	4b	Toluene	4
Tar oil	4	Toluene sulfonic	9a
Castor oil (fatty acids)	9a	Turpentine	4

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Aggressive chemical	Liquid group UNI EN 13529	Aggressive chemical	Liquid group UNI EN 13529
Motor oil	3	Trichlorobenzene	6b
Paraffin	4	Trichlorethylene	6
Phenil Sulfuric Acid	9	Urea	12
Brine (sodium chloride)	12	White spirit (solvent)	4
Methyl salicylate	7a	Xylene	4
Detergents (alkaline)	11	Chlorinated water	12

CHEMICAL PERFORMANCE UNI EN 1504/2.
Class I: after 3 days of contact Shore reduction < 50%;
Class II 28 days of contact Shore reduction < 50%;
Class III 28 days of contact under pressure Shore reduction < 50%

Chemical aggressive groups UNI EN 13529		Test liquid	Performance Shore D	
			White blue	yellow
1	Petrol	47.5% by volume of toluene 30.4% by volume of isooctane 17.1% by volume of n-heptane 3% by volume of methanol 2% by volume of tertiary butanol	---	---
2	Aviation fuel	1. 50.0% by volume of isooctane, 50.0% by volume of toluene 2. Aviation petrol 100 LL NATO Code F-18 3. Turbo fuel A-1 NATO code F-34 / F-35	Class II	Class II
3	Unused heating and diesel oil and engine and gear oils	80% by volume of n-paraffin (C12 - C18) 20% by volume of methylnaphthalene	Class II	Class II
4	All hydrocarbons including groups 2 and 3 except: 4 a) and 4 b) and engine and gear oils used	60% by volume of toluene 30% by volume of xylene 10% by volume of methylnaphthalene	Class II	Class II
4a	Benzene and benzene-containing blends (including 2 - 4 b)	30% by volume of benzene 30% by volume of toluene 30% by volume of xylene 10% by volume of methylnaphthalene	---	---
4b	Crude oil	10% by mass of isooctane 10% by mass of toluene 20% by mass of heating oil 10% by mass of 1-methylnaphthalene (95% min.) 47.7% by mass of heavy oil 0.2% by mass of thiophene (99%) 0.3% by mass of dibenzyldisulfide 0.5% by mass of dibutyldisulfide (97%) 1.0% by mass of mixture of naphthenic acids (acid value 230) 0.1% by mass of phenol 0.2% by mass of pyridine mixed with 2% by mass of water	---	---
5	Mono and polyalcohols (up to 48% by volume of methanol), glycol ethers	48% by volume of methanol 48% by volume of isopropanol 4% by volume of water	Class II	---
5a	All alcohols and glycol ethers (including 5)	Methanol		

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Chemical aggressive groups UNI EN 13529		Test liquid	Performance Shore D	
			White blue	yellow
6	Halogenated hydrocarbons [including 6 b)]	Trichlorethylene	---	---
6a	All aliphatic halogenated hydrocarbons (including 6 and 6 b)	Dichloromethane	---	---
6b	Aromatic halogenated hydrocarbons	Monochlorobenzene	---	---
7	All organic esters and ketones (including 7 a)	50% by volume of ethyl acetate 50% by volume of methyl isobutyl ketone	---	---
7a	Aromatic esters and ketones	50% by volume of salicylic acid methyl ester salicylate 50% by volume of acetophenone	---	---
7b	Biodiesel	Biodiesel	---	---
8	Aliphatic aldehydes	35% - 40% of formaldehyde solution	---	---
9	Aqueous solutions of organic acids up to 10%	10% aqueous acetic acid	Class II	Class II
9a	Organic acids (except formic acid) and their salts (in aqueous solution)	50% by volume of acetic acid 50% by volume of propionic acid		---
10	Inorganic acids up to 20% and acid hydrolysis salts in aqueous solution (pH <6) except hydrofluoric acid and oxidizing acids and their salts	Sulfuric acid 20%	Class II	Class II
11	Inorganic bases and their salts with alkaline hydrolysis in aqueous solution (pH> 8) except ammonium solutions and oxidizing solutions of salts (for example hypochlorite)	Sodium hydroxide 20%	Class II	Class II
12	Solutions of inorganic non-oxidizing salts with pH = 6 - 8	Aqueous solution of sodium chloride 20%	Class II	Class II
13	Amines and their salts (in aqueous solution)	35% by volume of triethanolamine 30% by volume of n-butylamine 35% by volume of N, N-dimethylaniline	Class II	---
14	Aqueous solutions of organic surfactants	1) 3% of Protectol KLC 50; 2% of Marlophen NP 9.5; 95% water 2) 3% of Texapon N 28, 2% Marlipal O 13/80, 95% water	---	---
15	Cyclic and acyclic ethers	Tetrahydrofuran (THF)	---	---
15a	Acyclic ethers	Ethyl ether	---	---

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APPLICATION SHEET

For every application detail (preparation of the substrate, primer and other parameters) refer to the technical data sheet of the MasterSeal 6391 system and to the MasterSeal systems application manual for white and black water management.

TEMPERATURE

The application can take place when the ambient temperature is between + 5°C and + 40°C and always higher than 3°C with respect to the dew point.

PREPARATION OF THE SUPPORT

Degraded concrete: repair with quick-drying mortar

Provide for the removal of the incoherent and degraded concrete layer or contaminated by oils, greases or other substances and then restore it to quick drying with MasterSeal P 385 D mixed with water only.

Non-degraded concrete

The surface must be prepared by sandblasting or sanding. Other specific techniques can also be used in specific cases (the choice of the same is to be evaluated following a site visit).

Resinous or ceramic substrates

The surface must be prepared by sandblasting or sanding. Only MasterSeal P 385 AB2D or MasterSeal P 385 ABC can be applied to this type of substrate.

Steel

For application on steel, MasterSeal M 391 does not need a primer.

These surfaces must be sandblasted to grade SIS Sa 3 (SSPC - SP 5) with a profile equal to grade n° 11 of Rugotest n ° 3.

SUPPORT SATURATION

Before proceeding with the application of MasterSeal P 385, wet the highly absorbent surfaces with water, then remove any excess water with rags or air jets.

The substrate must be saturated with a dry surface.

APPLICATION MasterSeal P 385 D + water

Add the mixing water indicated in the table to MasterSeal P 385 D. Mix with a whisk drill at low rotation speed (400-600 rpm) until a homogeneous mixture is obtained.

Apply the material with a spatula.

Technical information	
Density of the mixture	about 2 kg / liter
Mixing water	17.5% (4.3 -4.4 liters per bag)
Workability time	20 minutes at 20°C
Setting times at 20°C	start 45 minutes end 70 minutes
Operating temperature (air)	- 20°C - + 80°C
Complete hardening at 20°C	28 days

Apply the material with a spatula.

MASTERSEAL APPLICATION P 385 ABC (A + B + C)

Pour component B (hardener) into component A (base) and mix thoroughly until completely homogenized. Then add component C (inert) while stirring using a mechanical mixer. Mix until a homogeneous and lump-free mixture is obtained.

Technical information	
Useful life in an open jar	1 hour at + 20°C
Mixing ratios	18% A, 18% B, 64% C
Operating temperature	- 20 ° C - + 80°C (air)
Complete hardening at 20°C	7 days

It is applied with a spatula (without any addition of water) or by spray (adding no more than 5% of water), using pumps:

- screw type Turbosol T7 or equivalent with smoothing gun set up for the creation of thin layer coatings with the aid of an air compressor. Attention must be paid to consumption which could be higher than expected if you insist too much in one point;
- mixed system (Airless, Air-Assist), type Graco series Tex spray T-Max or equivalent, with or without the aid of a compressor using various spray lances (eg: free flow in-line gun);

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- piston type Graco Xtreme XL with "goose beak" gun for loaded materials and the same nozzles previously described or equivalent. The set pressure must be 200 - 250 bar depending on the surrounding conditions. Particular attention must be paid to the wear of the mechanical parts of the machine (piston, liner, o-ring and bands must be subject to periodic maintenance);
- during the application phase, keep the mixture constantly stirring. As is usually the case for products in aqueous dispersion, do not work under direct sunlight, with wind, fog or high humidity or risk of rain.

For further details contact the Technical Service.
Immediately after use, carefully wash the tools with water and detergent.

Fast version
To speed up the overcoating times with resinous materials, it is possible to add the specific accelerator MasterTop AC 1200 dosed at 3% on the weight of the epoxy components A + B to the mixture of MasterSeal P 385 ABC (A + B + C).
In this way the overcoating time at 20°C is 24 hours since the residual humidity value is <4% and the surface hard enough to accept sanding.

MasterSeal P 385 ABC Fast	
MasterSeal P 385 A	4,5 kg
MasterSeal P 385 B	4,5 kg
MasterSeal P 385 C	15 kg
MasterTop AC 1200	0,26 kg (3% su A+B)

APPLICATION MasterSeal P 385 AB2D (A + B + 2D)

Pour component B (hardener) into component A (base) and mix thoroughly until completely homogenized. If necessary, add water to the resin (A + B) just mixed up to a maximum of 10% of the total weight of component D. Then add component D at the rate of 2 bags under stirring using a mechanical mixer. Mix until a homogeneous and lump-free mixture is obtained.

Essential characteristic	
Pot life	20 minutes at + 20°C
Mixing ratios	7% A, 7% B, 86% 2D
Setting times at 20°C	Start 45 minutes End 85 minutes
Operating temperature	- 20 ° C - + 80°C (air)
Complete hardening at 20°C	28 days

Apply with an American trowel.
Immediately after use, carefully wash the tools with water and detergent.

APPLICATION MasterSeal M 391 Yellow

Mix the two components before use with a whisk drill. The product has a limited useful life in an open vessel and a high viscosity at low temperatures.

Essential characteristic MasterSeal M 391 Yellow	
Density kg / liter	A: 1,50; B: 1,50 A+B: 1,50
Solids by volume	100%
Pot life	20 minutes a + 20°C
Touch drying	20°C: 4 – 8 h
Deep drying	20°C: 12 – 48 h
Operating temperature, air	- 20° C – +80°C
Kinematic viscosity at 23°C mPa · s	A: c.a 13000 B: c.a 8000 A+B: c.a 11000
Mixing ratios by weight and by volume	2 A / 1 B
Full garment	7 days (a + 20°C)
Cleaning tools	Thinner for epoxies

For these reasons it can be applied by roller only for small surfaces and therefore for small quantities taking care to mix only part of the package and bring it to a temperature of at least 35 ° C. Dilution is allowed only with food-grade alcohol.
It can be applied by spray but only by airless equipped with bi-mixer type WIWA Duomix Series 230, WIWA FlexiMix II, Graco XM 70 or equivalent.
It is always recommended to apply in a single coat, for a consumption of 0.6 kg / m^2.

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Always check that the surface humidity of MasterSeal P 385 is less than or equal to 4% before being overvented.

MasterSeal P 385: residual humidity and overcoating times at 20°C (Carbide Hygrometer)

MasterSeal P 385	Time	Umidity	Recoating	
D + Acqua	24 ore	< 6 %	MasterSeal P 385 (ABC)	☺
Kit “ABC”	48 ore	< 4 %	MasterSeal M 391	☺
Kit ”AB2D”	24 ore	< 3 %	MasterSeal M 391	☺

APPLICATION MasterSeal M 391 Light blue and White

Mix the two components before use with a whisk drill. The product can be applied by roller or airless spray. Dilution is allowed only with food-grade alcohol.

Essential characteristic MasterSeal M 391 White e blue	
Density, kg / liter	A: 1,50, B: 1,00 A+B: 1,38 ± 0,02
Deep drying	20°C: 24 - 36 ore
Solids by volume	100%
Kinematic viscosity at 23°C mPa · s	A: c.a 4000 B: c.a 250 A+B: c.a 3000
Recoating time	20°C: 24 - 48 ore
Operating temperature, air	- 20° C – +80°C
Full garment	7 days (a + 20°C)
Pot life	60 minutes a 20°C
Mixing ratios	79 % A / 21 % B in weight
Touch drying	20°C: 6 - 8 h
Cleaning tools	Thinner for epoxies

It is always recommended to apply in two coats, for a total consumption of 0.6 kg / m^2, respecting the recoating times. It is advisable to prepare from time to time a quantity of product not exceeding that which can be applied during its useful life.

High temperatures accelerate hardening and reduce the use time of the prepared material.

Airless spray instrument	
Nozzle	Nozzle
Pressure at the nozzle	Pressure at the nozzle
Compression ratio	Compression ratio

CLEANING THE COVERED SURFACE BEFORE SERVICE

Before putting the tank into operation, it is recommended to wait respectively for at least two weeks (at 23°C). In any case, check whether the Shore D hardness has reached the final value.

Before filling the tanks with food, it is essential to wash them with a 10% aqueous solution of soda to disinfect the surfaces and remove any salts present. We then proceed with an abundant rinse with hot water. This procedure can cause a slight loss of gloss of the film which, however, does not change its technical characteristics.

During the service life of the tank and in correspondence with the service stops for periodic cleaning operations, chromatically non-homogeneous areas may appear on the surface of the vitrified tank (for example localized purple streaks). It is a purely aesthetic phenomenon which does not in any way modify the general performance of the glazing agent.

SANITIZATION OF TANKS FOR DRINKING WATER

Use a 1% sodium hypochlorite (bleach) solution in water. Leave on for at least 30 minutes and maximum 60 minutes, then wash thoroughly with tap water.

In case of heavily soiled surfaces, this process can be repeated a second time or higher concentrations of sodium hypochlorite (maximum 5%) can be used.

SAFETY INSTRUCTION

For information on the correct and safe use, transport, storage and disposal of the product, consult the most recent Safety Data Sheet.

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OTHER SERVICES

For price analysis, specifications, supplementary brochures, references, reports and technical assistance, visit the website www.master-builders-solutions.com/it-it or contact infomac@mbcc-group.com.

Scan the QR code to visit the product page and download the latest version of this datasheet.

Since 16/12/1992, Master Builders Solutions Italia Spa has been operating under a Certified Quality System compliant with the UNI EN ISO 9001 Standard. Furthermore, the Environmental Management System is certified according to the UNI EN ISO 14001 Standard and the Safety Management System is certified according to the UNI ISO 45001 Standard.

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