

MasterSeal M 790

2-component highly chemical resistant, crack-bridging membrane based on Xolutec for waterproofing and protection of concrete structures in harsh conditions

DESCRIPTION

MasterSeal M 790 is a two-component crack-bridging membrane based on Xolutec - Technology providing high chemical and mechanical resistance.

Xolutec™ - a new dimension in durability

Xolutec is an innovative and smart way of combining complementary chemistries. When the material is mixed on site a cross-linked interpenetrating network (XPN) is formed enhancing the overall material properties. By controlling the cross-linking density, the properties of Xolutec can be adjusted depending on the product performance required, e.g. this allows the formulation of materials with varying degrees of toughness and flexibility. Xolutec is very low in volatile organic components (VOC), is quick and easy to apply with both spray and hand application depending on requirements. It cures rapidly even at low temperature, reducing application time thus enabling fast return to service and minimizing downtime. This technology is not sensitive to moisture and tolerates a wide variety of different site conditions, greatly expanding the application window and reducing the potential for delays and failures. Long maintenance cycles and lower life cycle costs significantly reduce total cost of ownership.

FIELD OF APPLICATION

MasterSeal M 790 is used in waterproofing applications where a high level of chemical resistance is required.

This includes:

- Waste water treatment plants both in the inflow and outflow areas.
- Sewage effluent pipelines.
- Biogas plants.
- Secondary containment.

MasterSeal M 790 can be applied on:

- Horizontal and vertical substrates.
- Internal and external areas, also with rubber wheel traffic.
- Concrete, cementitious mortar or steel substrates.
- Reinforced concrete to protect it against carbonation or chloride induced corrosion and for protection against chemical attack in secondary containment bunds in chemical and petrochemical industries.

Contact your local Master Builders Solutions representative for any other applications not listed here.

FEATURES AND BENEFITS

- **Easy hand application by roller or trowel**
- **Continuous membrane:** monolithic – no laps, welds or seams
- **Excellent chemical resistance** – including high concentrations of biogenic sulphuric acid.
- **Waterproof** and resistant to standing water.
- **Fully bonded to substrate:** can be applied to a wide range of substrates with the appropriate primer.
- **Moisture tolerant:** can be applied on substrates with high residual humidity.
- **High resistance to carbon dioxide diffusion: Protects concrete from rebar corrosion.**
- **High tear, abrasion and impact resistance:** Withstands traffic and use in areas exposed to mechanical damages.
- **Tough but flexible and crack bridging.**
- **High durability** and protection with reduced cracking due to embrittlement
- **Thermoset:** does not soften at high temperatures.
- **Excellent adhesion** on different substrates (concrete, steel).
- **Weatherproof:** proven thundershower and freeze / thaw resistance, can be applied outdoors without additional top coating.
- **Does not contain solvents.**
- **Can be spray-applied** with selected 2-component spray machines (please contact our technical service for details)

APPROVALS AND CERTIFICATES

- Proven long-term resistance to biogenic sulfuric acid corrosion resistance (Fraunhofer Institute)
- CE Certification according to EN 1504-2
- Chemical Resistance according to EN 13529
- Bond Strength and blistering if exposed to reverse moisture according to DAfStb Repair Guideline
- DIBt -Approval for use in concrete in biogas facilities, tanks, bunker silos and for containment areas in storage and filling of liquid manure and silage (JGS).

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APPLICATION METHOD

(a) Surface Preparation

All substrates (new and old) must be structurally sound, dry, free of laitance and loose particles and clean of oil, grease, rubber skid marks, paint stains and other adhesion impairing contaminants.

Concrete: The surface should be prepared by shot blasting, high-pressure water jetting or other suitable mechanical method. After preparation, concrete and other cementitious substrates must have a minimum pull off strength of 1.5 N/mm² (lowest single value 1.0 N/mm²).

Wall/Floor connections must be rounded by using suitable products e.g. MasterSeal 590, MasterSeal P 385 Part D or MasterEmaco S 5440 RS

Iron / steel: Should be sand blasted to a SA 2½ finish prior to application of the product. No primer coat is needed for application of MasterSeal M 790 on steel.

Substrate temperature must be minimum +5 °C and maximum +35 °C. The temperature of the contact surfaces must be at least 3 °C above the ambient dew point temperature.

(b) Primer coat

A primer coat will improve the adhesion and prevent the appearance of pinholes or bubbles in the hardened coating. The recommended primer for MasterSeal M 790 is MasterSeal P 770*. The substrate should be visibly dry - there is no limit to residual humidity. The temperature of the contact surfaces must be at least 3 °C above the ambient dew point temperature. MasterSeal P 770 can be applied by roller in one layer and its consumption is approx. 0.25 - 0.4 kg/m². Wait for at least 5 hours (at + 20° C) before applying MasterSeal M 790. We recommend overcoating the primer within the next 48 hours of its application. If this time is exceeded, please contact your Master Builders Solutions Technical representative.

** Please refer to relevant product data sheet for details.*

(c) Mixing

MasterSeal M 790 is supplied in working kits which are pre-packaged in the exact mixing ratio.

Pour the entire content of Part A into the container of Part B and mix with a mechanical drill and paddle at low speed (max. 400 rpm) for 90 seconds. Scrape the sides and the bottom of the container several times to ensure complete mixing. Keep the mixer blades submerged in the coating to avoid introducing air bubbles.

Do not mix part packs and do not mix by hand!

Attention: unused remains of mixed material can lead to a strong heat development in the pail. Always use up all mixed material completely.

(d) Application

MasterSeal M 790 can be applied by brush or roller. It is always recommended to complete the application in a minimum of two layers.

Minimum waiting time before application of second coat is 8 hours (overnight) at +20 °C ambient and substrate temperature. We recommend completing the application of the subsequent coat within 48 hours. If this time is exceeded, please contact your Master Builders Solutions representative.

FINISHING AND CLEANING

Tools can be cleaned with solvent-based cleaner while still wet. Once cured, the material can only be removed mechanically.

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COVERAGE

The consumption of MasterSeal M 790 hand-applied is approximately 0.4 kg/m² per coat. A minimum of two coats is required, depending on the condition and porosity of the substrate and requested film thickness. A two-coat application with a total consumption of approximately 0.8 kg/m² will provide a dry film thickness of approx. 0.7 – 0.8 mm. In high chemically demanding environments (e.g. waste water treatment plants) and/or in harsh, abrasive conditions, a dry film thickness of 1.0 - 1.1 mm is recommended. Therefore, a minimum consumption of 1.0 - 1.2 kg /m² in two or three layers must be applied.

With the specific spraying equipment, the application of up to 1 mm thickness can be completed in one coat.

These consumptions are theoretical and can vary according to the absorption and roughness of the substrate. It is essential to carry out representative trials on site to evaluate the exact consumption.

WORKING TIME

Approximately 20 minutes at +20 °C ambient and substrate temperature.

PACKAGING

MasterSeal M 790 is available in

- 5 kg Kits consisting of 1.5 kg Part A and 3.5 kg Part B
- 30 kg Kits consisting of 9 kg Part A and 21 kg Part B

COLOURS

Grey and Red

STORAGE

MasterSeal M 790 should be stored in original containers under dry conditions at temperatures between 10 - 25° C preferably. Protect from frost and no permanent storage over +30 ° C.

SHELF LIFE

Shelf life under these conditions is 12 months for both parts.

WATCH POINTS

- Do not apply at temperatures below +5 °C nor above + 35 °C
- Do not add any solvents, sand or other components to MasterSeal M 790 mixes.
- Ensure application in a continuous layer avoiding pinholes, or surface defects that can facilitate penetration of chemicals to substrate.
- Under strong UV radiation the hardened membrane can yellow; this has however no influence on the chemical resistance and mechanical performance of the material.
- Attention: unused remains of mixed material can lead to a strong heat development in the pail. Use up all material completely!
- Lower temperatures can cause both components of MasterSeal M 790 to become more viscous. This phenomenon does not affect the properties or the workability of the product. Material can be mixed normally.

HANDLING AND TRANSPORT

Usual preventive measures for the handling of chemical products should be observed when using this product, for example do not eat, smoke or drink while working and wash hands when taking a break or when the job is completed. Specific safety information referring the handling and transport of this product can be found in the Material Safety Data Sheet.

Disposal of product and its container should be carried out according to the local legislation in force. Responsibility for this lies with the final owner of the product.

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Product Data				
Property		Standard	Unit	Data
Density	Part A Part B mixed material	EN ISO 2811-1	g/cm ³	approx. 1.27 approx. 1.15 approx. 1.2
Viscosity of mixed material		EN ISO 3219	mPas	approx. 2800
Application temperature (substrate and material)		-	°C	from +5 to +35
Maximum substrate moisture (during application)		not restricted, but surface must be visibly dry		
Maximum relative humidity (during the application)		not restricted, but no condensation of water on the surface		
Pot-life (5 kg kit)		at +10° C at +20° C at +30° C	minutes	approx. 25 approx. 20 approx. 15
Re-coating interval		at + 5° C at + 20 °C at + 30°C	hours	approx. 24 approx. 8 approx. 4
Exposure to water pressure after		at +20° C	hours	24
Fully cured after		at +20° C	days	7
Service temperature (dry)		-	°C	- 20 to +80
Service temperature (wet)		-	°C	up to +60
Adhesion to concrete (dry) after 28 d		EN 1542	N/mm ²	2.9
Adhesion to concrete (wet) after 28 d		EN 13578	N/mm ²	2.2
Adhesion to steel (without primer)		EN 12188	N/mm ²	> 7.0
Adhesion strength after freeze-thaw cycles		EN 13687-1	N/mm ²	2.7
CO ₂ permeability S _D		EN 1062-6	m	206 (required > 50)
Water vapour permeability S _D		EN ISO 7783	m	126 (class III S _D > 50)
Capillary water absorption		EN 1062-3	kg/m ² ·h ^{0.5}	0.0005 (required < 0.1)
Behaviour after artificial weathering (2000 h)		EN 1062-11	-	no blistering, cracking or flaking; colour change
Tensile strength		EN ISO 527-1/-2	N/mm ²	> 20
Abrasion resistance - Taber test (mass loss)		EN ISO 5470 -1	mg	194 (required < 3000)
Abrasion resistance - BCA test (thickness loss)		EN 13894-2	µm	< 10 (= class AR 0,5)

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Product Data (continued)			
Dynamic friction (test for rubber wheel traffic) 20,000 cycles dry 20.000 cycles wet	“Stuttgarter Gerät”	-	no abrasion of material no abrasion of material
Impact resistance	EN ISO 6272/2	Nm	24.5 (class III > 20)
Shore D hardness after 7 d	EN ISO 868/07	-	80
Reaction to Fire	EN 13501-1	-	Class E
Static crack bridging	EN 1062-7	Class	A3 (+ 23 °C)
			A2 (+70°C, dry), A2 (-10°C)
Dynamic crack bridging	EN 1062-7	Class	B3.1 (23° C)
			B2 (-10° C)
Elongation at break	DIN 53504	%	20
Resistance to positive water pressure	EN 12390-8	bar	5
Resistance to negative water pressure	based on UNI 8298-8	bar	2.5
Resistance to osmotic pressure	DAfStb, Part 4, Section 5.5.15	-	No adhesion change and no bubble formation with MasterSeal P 770 and MasterSeal P 385 as primers

Note: All parameters (unless indicated otherwise) have been measured at 20°C ± 2°C and 60% ± 10% relative humidity. Higher temperatures and/or higher relative humidity can shorten these times, and vice versa. Technical data shown are statistical results and do not correspond to guaranteed minima. Tolerances are those described in appropriate performance.

Chemical resistance (according EN 13529)			
Group	Description	Test Liquid	Result*
DF 1	Gasoline	47.5% toluene + 30.4% isooctane + 17.1% n-heptane + 3% methanol + 2% 2-methyl-propanol-(2)	Class III (8%)
DF 2	Aviation fuels	50% toluene + 50% isooctane Aviation fuel 100 LL NATO code F18 Turbo fuel A1 NATO Code F34/F35	Class III (9%)
DF 3	Fuel oil, Diesel fuel and other unused combustion motor oils	80 % n-paraffin (C12 to C18) + 20 % methylnaphthalene	Class III (8%)
DF 4	All hydrocarbons as well as mixtures containing benzene with max. 5 Vol. %	60% toluene + 30% xylene + 10% methylnaphthalene	Class III (19%)
DF 4a	Benzene and benzene containing mixtures (incl.4)	30% benzene + 30% toluene + 30% xylene + 10% methylnaphthalene	Class III (25%)**

* values in brackets are reduction of shore A hardness

** colour change

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Chemical resistance (according EN 13529) – continued			
Group	Description	Test Liquid	Result*
DF 5	Mono- and polyvalent alcohols (up to a max. 48 vol.-% methanol), glycol ethers	48 Vol.-% methanol + 48 Vol.-% IPA + 4% water	Class III (35%)
DF 5a	All alcohols and glycol ethers (incl. 5 and 5b)	methanol	Class III (48%)
DF 6	Halogen hydrocarbons \geq C2 (incl. 6b)	trichloroethylene	Class III (18%)
DF 6a	All halogen hydrocarbons (incl. 6 and 6b)	Dichloromethane (methylene chloride)	Class I
DF 6b	Aromatic halogen hydrocarbons	monochlorobenzene	Class III (20%)
DF 7	All organic esters and ketones (including. 7a)	50 % ethyl acetate + 50 % methyl isobutyl ketone	Class II (43%)
DF 9	Aqueous solutions of organic acids (carboxylic) up to 10 % as well their salts	10 % aqueous acetic acid	Class III (8%)**
DF 9a	Organic acids (carboxylic, apart from formic acids) as well as their salts	50% acetic acid + 50% propionic acid	Class I
DF 10	Mineral acids (non oxidizing) up to 20% and inorganic salts in aqueous solution (pH<6) except HF	Sulphuric acid (20%)	Class III (10%)
DF 11	Inorganic lye (except oxidizing) and inorganic salts in aqueous solution (pH>8)	Sodium hydroxide solution (20%)	Class III (11%)
DF 12	Aqueous solutions of inorganic non-oxidizing salts with a pH value between 6 and 8	Aqueous sodium chloride solution (20%)	Class III (13%)
DF 13	Amines as well as their salts (in aqueous solution)	35 % triethanolamine + 30 % n-butylamine + 35 % N,N-dimethylaniline	Class I
DF 14	Aqueous solutions of organic surfactants	1) 3 % Protectol KLC 50 + 2 % Marlophen NP 9,5 + 95 % water 2) 3 % Texapon N 28 + 2 % Marlipal O 13/80 + 95 % water	Class III (10%)
DF 15	Cyclic and acyclic ethers (including 15a)	Tetrahydrofurane (THF)	Class I
DF 15a	Non-cyclic ethers	Diethyl ether	Class III (19%)

Class I: 3 d without pressure	Reduction in hardness of less than 50% when measured according to Buchholz method, EN ISO 2815, or Shore method EN ISO 868 24 h after the coating is removed from immersion in the test liquid.
Class II: 28 d without pressure	
Class III: 28 d with pressure	

* values in brackets are Reduction of shore A hardness

** colour change

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Chemical Resistance - additional media			
Media	Temperature	Duration of impact	Resistance*
Acids			
Sulphuric acid 50%	50° C	170 h	++
Sulphuric acid 30%	50° C	500 h	++
Phosphoric acid 85%	20 °C	500 h	++**
Nitric acid 30%	20 °C	500 h	+**
Acetic acid 20%	20° C	310 h	++
Lactic acid 30%	20° C	170 h	++
Lactic acid 25%	50° C	500 h	+
Sulphuric acid 20% + lactic acid 5%	50° C	170 h	++
Formic acid 5%	20° C	500 h	++
Formic acid 40%	20° C	500 h	+
Lyes			
Sodium hydroxide 50%	20° C	500 h	++
Sodium hydroxide 50%	50° C	500 h	++
Potassium hydroxide 50%	20° C	500 h	+
Ammonia 25%	20° C	310 h	-
Organic chemicals			
Ethanol 50%	20° C	310 h	o
Toluene	20 °C	500 h	o
Gasoline acc. to EN 228 and DIN 51626-1	20 °C	500 h	++
Specific solutions			
Silage water (3% milk + 1.5% vinegar +0.5% butyric acid)	40 °C	500 h	++
Liquid manure (7% ammonium hydrogen phosphate)	40 °C	500 h	++
Distilled water	40 °C	500 h	++
Chlorine bleaching	50 °C	170 h	++
Chlorinated water	20 °C	500 h	++
Hydrogen peroxide 30%	20 °C	500 h	++


* Tensile Strength development in comparison to untreated sample:

++	100 – 80%	→ resistant without any changes
+	79 -55%	→ medium resistant
o	54 -45%	→ short term resistant (occasional contact or splashing mode)
-	< 45%	→ not resistant

** Colour change

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16	
700001	
EN 1504-2:2004	
Surface protection product / coating EN 1504-2: Principles 1.3 / 2.2 / 5.1 / 6.1 / 8.2	
Abrasion resistance	≤ 3000 mg
Permeability to CO ₂	Sd > 50
Permeability to water vapour	Class III
Capillary absorption and permeability to water	< 0.1 kg/(m ² xh ^{0.5})
Thermal compatibility after freeze-thaw cycling	≥ 1.5 N/mm ² Pass
Resistance to severe chemical attack Class I: 4a,6a,9a,13,15 Class III: 1,2,3,4,5,5a,6,7,9,10, 11,12,14,15a	Reduction of hardness < 50 %
Crack bridging ability	A3 (23°C) A2 (-10°C) B3.1 (23°C) B2 (-10°C)
Impact resistance	Class III
Adhesion strength by pull-off test	≥ 1.5 N/mm ²
Reaction to fire	Class E
Dangerous substances	Comply with 5.3 (EN 1504-2)

NPD = No performance determined. Performance determined in system build up **MasterSeal 7000 CR**.

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DISCLAIMER

In view of widely varying site conditions and fields of application of our products, this technical data sheet is meant to provide general application guidelines only. This information is based on our present knowledge and experience. The customer is not released from the obligation to conduct careful testing of suitability and possible application for the intended use. The customer is obliged to contact the technical helpline for fields of application not expressly stated in the technical data sheet under "Fields of Application". Use of the product beyond the fields of application as stated in the technical data sheet without previous consultation with Master Builders Solutions and possible resulting damages are in the sole responsibility of the customer. All descriptions, drawings, photographs, data, ratios, weights i.e. stated herein can be changed without advance notice and do not represent the condition of the product as stipulated by contract. It is the sole responsibility of the recipient of our products to observe possible proprietary rights as well as existing laws and provisions. The reference of trade names of other companies is no recommendation and does not exclude the use of products of similar type. Our information only describes the quality of our products and services and is no warranty. Liability is accepted for incomplete or incorrect particulars in our data sheets only in the event of intent or gross negligence, without prejudice to claims under product liability laws.

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