

# MasterSeal<sup>®</sup> M 689

**A highly elastic, ultrafast curing, spray applied 100% polyurea membrane for use in waterproofing applications**

## DESCRIPTION

**MasterSeal M 689** is a solvent free, two component waterproofing membrane. It is highly reactive and can only be applied by special two component hot spray equipment.

## FIELDS OF APPLICATION

**MasterSeal M 689** is used in a variety of waterproofing applications, especially where a high degree of chemical and mechanical resistance is required.

Easy application to complicated details.

This includes:

- Wastewater treatment plants (urban and industrial), both in the inflow and outflow areas.
- Sewage effluent pipelines.
- Steel and concrete pipes.
- Secondary containment bunds in chemical and petrochemical industries.

Additionally, MasterSeal M 689 can be applied on:

- Flat and architectural roofs.
- Horizontal and vertical substrates.
- Internal and external areas.
- Concrete, cementitious mortar or steel substrates.
- Reinforced concrete to protect it against carbonation, chloride induced corrosion or chemical attack in industrial environments.

Contact your local Master Builders Solutions representative regarding any application required not mentioned here.

## FEATURE & BENEFITS

- **Spray delivered and ultrafast curing:** enables easy application to form a monolithic waterproofing membrane on simple and complex surfaces.
  - Application to vertical surface without runs.
  - Easy application to complicated details
- **Rapid curing:**
  - Rain resistance after only 30 seconds.
  - Allows early serviceability
  - Fully trafficable after only 12 hours
- **Continuous membrane:** monolithic – no laps, welds, or seams
- **Excellent chemical resistance.**

- **Waterproof and resistant to standing water.**
- **Fully bonded to substrate:** can be applied to a wide range of substrates with the appropriate primer.
- **High water vapour permeability:** low risk of blistering.
- **High resistance to carbon dioxide diffusion:** Protects concrete from rebar corrosion.
- **High abrasion and impact resistance:** Withstand mechanical traffic.
- **High elasticity and crack bridging capability:**
  - Remains elastic at low temperatures; T<sub>g</sub> approx. – 45 °C
  - High durability and protection with reduced cracking due to embrittlement
- **Thermoset** – does not soften at high temperatures.

## APPROVALS AND CERTIFICATES

- CE marked according EN 1504 part 2.
- Chemical resistance according EN 13529.
- Roof BBA certification
- Z 59.12-414 according WHG.
- Complies Council Directive 98/83/EC. Drinking Water Directive (DWD)
- Fire resistance according EN 13501 part 1.
- Fire resistance according EN 13501-5: Broof (t4)
- ETA-17/0508 according ETAG 005 Part 6
- Complies Japan Bureau of sewage management lining coating Type D

## APPLICATION METHOD

### a) Surface Preparation

The preparation of the substrate and the use of the appropriate primer are of paramount importance. All surfaces to which **MasterSeal M 689** is applied should be sound, clean, and dry and free from oil or grease, loose particles and any other substances which may impair adhesion.

For substrate pre-treatment prior to the primer application see primer technical data sheet.

### Concrete and cementitious screed

Concrete and other cementitious substrates must have a minimum pull off strength of 1.5 N/mm<sup>2</sup>. Any laitance present on the surface must be removed mechanically. Shot blasting is the preferred method.

# MasterSeal® M 689

Release oil and other contaminants which may impair adhesion must be removed prior to the application of the primer.

## Iron / steel

Should be sand blasted to a Sa 2 ½ finish prior to application of the primer.

## Primer

Use the following guide to select the appropriate primer:

Substrate	Primer
Concrete	MasterTop P 622 MasterSeal P 658 MasterSeal P 770
Humid mineral substrates	MasterSeal P 385
Plywood	MasterTop P 660 or MasterSeal P 691
GRP	MasterSeal P 691
Iron / steel (not stainless)	MasterSeal P 681
Non-ferrous metals (e.g. aluminium, zinc)	MasterSeal P 684
Aged MasterSeal (PU) waterproofing membranes	MasterSeal P 691

In some circumstances, other primers may be more appropriate. For further details, please consult your local sales office.

## b) Mixing

Dose and mix with suitable air driven or electrical two-part hot spray equipment. The accuracy of mixing and dosage must be controlled regularly with the equipment.

Before use stir content in Part A drums to homogenous. Precondition the membrane components to the correct temperature of 65 – 70 °C for PTA and 80 – 85 °C for PTB prior to application.

Check mix ratios are correct at the start of spraying and regularly throughout the spraying procedure.

## c) Application

**MasterSeal M 689** can only be applied by means of a suitable two components heated, high pressure, proportioning spray equipment (e.g. Graco® GlasCraft® Gusmer, Wiwa®, Gama® or any other suitable). The choice of machine depends to a large extent on the type and size of work to be completed. For advice, please contact Master Builders Solutions.

**MasterSeal M 689** should only be applied to properly prepared substrates. For best results substrate and air temperature should be in a range 5 – 35 °C. However, in very cold conditions the use of barrel heaters may

be required to ensure the optimal operation of barrels pumps.

**MasterSeal M 689** should be applied within the recommended temperature and relative humidity limits. The temperature of the substrate should be min. 3 K above the dew point. Due to the fast reaction, it is possible to rapidly build thicknesses from 1.5 to more than 6 mm.

Surrounding areas should be protected from overspray by masking off. Care should be taken to prevent spray mist being carried by wind by erecting suitable barrier

## d) Topcoat

**MasterSeal M 689** can be used directly in exposed applications as the mechanical properties are not affected but has limited aesthetical UV resistance.

Do not topcoat **MasterSeal M 689** in case of application exposed to harsh chemical environments.

The use of pigmented **MasterSeal M 689** can avoid the application of topcoat but not avoid the surface yellowing of the membrane.

To increase UV resistance a number of topcoats are available including MasterSeal TC 259 for most standard applications, and MasterSeal TC 258 or MasterSeal TC 681 which can be broadcast with dry silica sand to provide a hard wearing, slip resistant finish. Other topcoats may be more suitable for specific applications, consult your local sales office for further details.

## COVERAGE

**MasterSeal M 689** is normally applied at 2.2 – 2.5 kg/m<sup>2</sup>. This corresponds to a thickness of approx. 2.0 – 2.3 mm. Details require a higher coverage rate up to 4.0 kg/m<sup>2</sup> or more.

*The above consumption figures are intended as a guide only and may be higher on very rough or porous substrates*

## Re-coatings intervals

Next layer	Hours min.			Hours max.		
	Temperature			Temperature		
	[°C]			[°C]		
	10	20	30	10	20	30
MasterSeal M 689	immediately			8*	4*	2*
MasterSeal P 691	4	2	2	14 days **		
Wear coat	4	3	2	36*	24*	16*
Topcoat	4	3	2	24*	16*	12*

\* If the re-coating times are exceeded or if rain falls

## MasterSeal<sup>®</sup> M 689

or dew forms on the **MasterSeal M 689** then allow to dry thoroughly and apply **MasterSeal P 691** according to manufacturer instructions before proceeding.

\*\* If the re-coating interval exceed 14 days, the **Master Seal M 689** must be lightly abraded, and the dust removed by vacuum cleaning and solvent wipe prior to the application of the **MasterSeal P 691**

### FINISHING AND CLEANING

Reuseable tools should be cleaned carefully with Cleaner 40 or e.g. solvent naphtha.

### PACKAGING

Part A	200 kg in 200 l drums
Part B	225 kg in 200 l drums

### COLOUR

**MasterSeal M 689** is available in the following colour combination:

#### Part A:

- Dark Grey close to RAL 7043
- Medium Grey close to RAL 7042
- Light Grey close to RAL 7035
- black
- colourless (to be coloured with Master Builders Solutions authorized pigment paste by approx. 3~5 %. Stir well before use!)

**Part B:** Unpigmented

### STORAGE & SHELF LIFE

Store in original containers under dry conditions at a temperature between 15° – 25° C. Do not expose to direct sunlight. For maximum shelf life under these conditions see "Best before " label.

### WATCH POINTS

This product conforms to the EU directive 2004/42/EG (Deco-Paint directive) and contains less than the maximum allowable VOC limit (Stage 2, 2010)

According to the EU directive 2004/42, the maximum allowable VOC content for the Product Category IIA / j is 500 g/l (Limit: Stage 2, 2010). The VOC content for **MasterSeal M 689** is < 500 g/l (for the ready to use product).

### HANDLING/ PREACUTIONS

In its cured state, **MasterSeal M 689** is physiologically non-hazardous. The following protective measures should be taken when working with this material:

Wear safety gloves, goggles, and protective clothing. Avoid contact with the skin and eyes. In case of eye contact, seek medical attention. Avoid inhalation of the fumes. Respiratory protection must be worn when spraying or when in the vicinity of the spraying operation.

When working in well ventilated areas, a combined charcoal filter and particle filter mask (A-P2) should be worn. When working in less well ventilated and in confined spaces, air-fed helmets are to be worn by sprayer and assistant(s). When working with the product do not eat, smoke, or work near a naked flame.

For additional references to safety hazard warnings, regulations regarding transport and waste management please refer to the relevant Material Safety Data Sheet.

The regulations of the local trade association and/or other authorities, regulating safety and hygiene of workers handling polyurethane and isocyanates must be followed.

# MasterSeal<sup>®</sup> M 689

TECHNICAL DATA			
Properties	Standard	Data	Unit
Chemical base	-	100% Polyurea	-
Mixing ratio:	A : B	100: 100 100: 112	by volume by weight
Density (at 20 °C)	Part A Part B	1.00 1.11	g/cm <sup>3</sup>
Viscosity (at 25 °C)	Part A Part B	220 800	mPas
Processing temperature (Flow heater, Hose heater):	Part A Part B	65 - 70 80 - 85	°C °C
Hose Temperature		70 - 75	°C
Spray Pressure		170 - 200	bar
Substrate and ambient temperatures (during application)	-	min. 5 max. 35	°C °C
Maximum relative humidity (during application):	-	90	%
Maximum substrate moisture (during application):	-	4	%
Reaction time (sprayed)	-	5 – 7	sec.
Dry to touch after:	at +20°C	30	seconds
Ready for pedestrian traffic after:	at +20°C	0,5	Hours
Fully cured – ready for car traffic after:	at +20°C	12	Hours
Exposure to chemicals after:	at +20°C	24	Hours

# MasterSeal<sup>®</sup> M 689

TECHNICAL DATA AFTER CURING			
Properties	Standard	Data	U nit
Density of mixed material:	EN ISO 2811-1	approx. 1,1	g/cm <sup>3</sup>
Shore-A-hardness:	-	90 (+/-3)	-
Shore-D-hardness:	-	40 (+/-2)	-
Tensile Strength:	DIN 53504	20 (+/-1)	N/mm <sup>2</sup>
Elongation at break:	DIN 53504	405(+/-5)	%
Tear strength:	DIN 53515	55(+/-3)	N/mm <sup>2</sup>
Static Crack Bridging:	EN 1062-7 (A)	A5 (+23°C)	-
Dynamic Crack Bridging:	EN 1062-7 (B)	B4.2 (-20°C)	-
Fire Behaviour:	EN 13501-1	C <sub>FL-s1</sub>	-
Capillary Water Absorption:	EN 1062-3	0,002	Kg/m <sup>2</sup> /h <sup>0,5</sup>
Water Vapour Permeability (SD):	EN ISO 7783-1	< 5 / Class I (μ = 3658)	m
CO <sub>2</sub> Permeability (SD):	EN 1062-6	>120 (μ = 68950)	m
Methane Permeability:	DIN 53380	50	cm <sup>3</sup> /m <sup>2</sup> ·24h
Adhesion to Concrete:	EN 1542	>3	N/mm <sup>2</sup>
Adhesion strength after freeze-thaw cycles:	EN 13687-1	>3	N/mm <sup>2</sup>
Behaviour after artificial weathering:	EN 1062-11	No changes	-
Abrasion resistance (Taber H22, 1000 g, 1000 c):	EN ISO 5470 -1	Mass loss < 150	mg
Impact Resistance:	EN ISO 6272/2	>20 (Class III)	Nm
Slip/Skip Resistance	EN 13036-4	Dry: 63 (Class II) Wet: 30	-
Service Temperature (dry):	-	- 30 to +130	°C
Service Temperature (high moisture, but not wet):	-	0 to +80	°C
Service Temperature (wet):	-	0 to +55	°C

- The above figures are intended as a guide only and should not be used as a basis for specifications.

# MasterSeal<sup>®</sup> M 689

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 propa nol-(2)	Class II
DF 2	Aviation fuels	50% toluene + 50% isooctane Aviation fuel 100 LL NATO code F18 Turbo fuel A1 NATO Code F34/F35	Class I
DF 3	Fuel oil, Diesel fuel and other unused combustion motor oils	80 % n-paraffin (C12 to C18) + 20 % methylnaphthalene	Class III
DF 4	All hydrocarbons as well as mixtures containing benzene with max. 5 Vol. %	60% toluene + 30% xylene + 10% methylnaphthalene	Class I
DF 4a	Benzene and benzene containing mixtures (incl.4)	30% benzene + 30% toluene + 30% xylene + 10% methylnaphthalene	No
DF 4b	Crude oils	10% isooctane + 10 % toluene + 20 % fuel oil + 10 % 1-methylnaphthalene (min 95 %) + 47.7 % heavy fuel oil + 0.2 % thiophene (99 %) + 0.3 % dibenzylidissulfide + 0.5 % dibutylidissulfide (97 %) + 1.0 naphthenic acid mixture + 0.1 % phenol+ 0.2 % pyridine + 2 % water	Class III
DF 4c	Used combustion motor oil and used automotive transmission oil with a flash point > 55 °C	80% motor oil + 10% toluene + 9.9% water + 0.1% anionic tenside	Class III
DF 5	Mono- and polyvalent alcohols (up to a max. 48 vol.-% methanol), glycol ethers	48 Vol.-% methanol + 48 Vol.-% IPA + 4% water	Class I (7d)
DF 5a	All alcohols and glycol ethers (incl. 5 and 5b)	methanol	Class I (7d)
DF 5b	Single and multi-valent alcohols ≥ C2	48 Vol.-% ethanol + 48 Vol.-% IPA + 4% water	Class I (7d)
DF 6	Halogen hydrocarbons ≥ C2 (incl. 6b)	trichloroethylene	No
DF 6a	All halogen hydrocarbons (incl. 6 and 6b)	dichloromethane (methylene chloride)	8 hours
DF 6b	Aromatic halogen hydrocarbons	Monochlorobenzene	No
DF 7	All organic esters and ketones (including. 7a)	50 % ethyl acetate + 50 % methyl isobutyl ketone	Class I (14 d)
DF 7a	Aromatic esters and ketones	50% methyl salicylate + 50% acetophenone	Class I (14 d)



## MasterSeal<sup>®</sup> M 689

DF 7b	Biodiesel fuel	Rape-oil fatty acid methyl ester	Class III
DF 8	Aqueous solutions of aliphatic aldehyde up to 40 %	Formaldehyde (35% - 40%)	Class I (7d)
DF 8a	aliphatic aldehydes as well as their aqueous solutions (including 8)	50% butanal + 50% heptanal	Class I (7d)
DF 9	Aqueous solutions of organic acids (carboxylic) up to 10 % as well their salts	10 % aqueous acetic acid	Class III
DF 9a	Organic acids (carboxylic, apart from for- mic acids) as well as their salts	50 Vol.-% acetic acid +50 Vol.-% propionic acid	No
DF 10	Mineral acids (non oxidizing) up to 20% and inorganic salts in aqueous solution (pH<6) except HF	Sulphuric acid (20%)	Class III
DF 11	Inorganic lye (except oxidizing) and inorganic salts in aqueous solution (pH>8)	Sodium hydroxide solution (20%)	Class III
DF 12	Aqueous solutions of inorganic non-oxidizing salts with a pH value between 6 and 8	Aqueous sodium chloride solution (20%)	Class III
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
DF 15	Cyclic and acyclic ethers (including 15a)	tetrahydrofuran (THF)	No
-	Specific Chemical	diphenylmethandisocyanat (MDI)	Class III
-	Specific Chemical	toluylendiisocyanat (TDI)	Class III
-	Specific Chemical	polyetherpolyol	Class III
-	Specific Chemical	polyesterpolyol	Class III
-	Specific Chemical	monoethylengycol	Class III

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	



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CE-MARKING (EN 1504-2)		CE-MARKING (EN 13813)	
			
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Master Builders solutions Coatings GmbH Donnerschweer Str. 372, D-26123 Oldenburg		Master Builders Solutions Coatings GmbH Donnerschweer Str. 372, D-26123 Oldenburg	
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468901		468901	
EN 1504-2:2004		EN 13813:2002	
Surface protection product - coatings EN 1504-2: ZA.1d, ZA.1e, ZA.1f and ZA.		Synthetic resin screed for use internally in buildings EN 13813: SR-B1,5-AR1-IR4	
Linear shrinkage	NPD	Essential characteristics	Performance
Compressive strength	NPD	Fire behavior	Efl
Abrasion resistance	≤ 3000 mg	Release of corrosive substances	SR
Permeability to CO <sub>2</sub>	Sd > 50	Water permeability	NPD
Permeability to water vapour	Class I	Wear resistance	< AR 1
Capillary absorption and permeability to water	< 0.1 kg/(m <sup>2</sup> xh <sup>0.5</sup> )	Bond strength	> B 1,5
Thermal compatibility after freeze-thaw cycling	≥ 1.5 N/mm <sup>2</sup>	Impact resistance	> IR 4
Resistance to severe chemical attack	Reduction of hardness < 50%	Impact sound insulation	NPD
Impact resistance	Class III	Sound absorption	NPD
Adhesion strength by pull-off test	≥ 1.5 N/mm <sup>2</sup>	Heat insulation	NPD
Reaction to fire	C <sub>fi-s1</sub>	Chemical resistance	NPD
Skid resistance	NPD	Slip/Skid resistance	NPD
		Emissions behavior	NPD
NPD = No performance determined. Performance determined in system build up <b>MasterSeal 6689</b>		NPD = No performance determined. Performance determined in system build up <b>MasterSeal 6689</b>	

® = registered trademark of MBCC Group member in many countries of the world

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