

MOWILITH® LDM 6880 –

The additive for producing liquid-proof concrete





MOWILITH® LDM 6880

FOR LIQUID-PROOF CONCRETE

Water is the basis of life. Only one drop of mineral oil can contaminate up to 1,000 liters of water. Therefore, various laws worldwide express the consciousness of environmental issues for groundwater protection. According to §62 of the German Federal Water Act (WHG), facilities for storing, decanting, manufacturing, handling and using water-hazardous materials must be constructed, erected and operated in such a way, that any water contamination is prevented. Thus, when designing components for this purpose, it is necessary to ensure special care and execution.

► **The need for protecting water**

Concrete has a capillary structure that allows the ingress of liquids. The longer concrete is exposed to a liquid, the deeper the liquid can penetrate into the building material.

To protect water and the environment, the impermeability of concrete must be ensured when planning and executing systems for storing, decanting, manufacturing, handling and using water-hazardous materials.

► **The solution: MOWILITH® LDM 6880**

MOWILITH® LDM 6880 is a copolymer dispersion and approved for construction by the German Institute for Construction Technology (DIBt). It reduces the penetration depth in liquid-proof concrete while significantly improving the impermeability of concrete towards aggressive substances such as acids, saline solutions, fuel and other substances hazardous to water.

Therefore, MOWILITH® LDM 6880 is particularly suitable for the production of liquid-proof concrete in accordance to various regulation worldwide such as to the German Federal Water Act (WHG) and the German Committee for Structural Concrete's (DAfStb) directive "Concrete constructions in connection with substances hazardous to water"

MOWILITH® LDM 6880

FOR CONCRETE MEETING WATER PROTECTION REQUIREMENTS



FEDERAL WATER ACT
OF GERMANY



GERMAN ORDINANCE ON
INSTALLATIONS FOR HANDLING
SUBSTANCES HAZARDOUS TO
WATER (AWSV)



DWA-A 781 & 786



GERMAN COMMITTEE
FOR STRUCTURAL CONCRETE
(DAFSTB) GUIDELINE

► **MOWILITH® IS A REGISTERED TRADEMARK OF CELANESE EMULSIONS GMBH.**
MOWILITH® LDM 6880 IS THE SAME PRODUCT LIKE CELVOLIT® LDM 6880. THE BRAND NAME MOWILITH® IS USED WITHIN EUROPE
WHEREAS THE CELVOLIT® BRAND NAME IS USED OUTSIDE EUROPE.



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MOWILITH® LDM 6880

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MOWILITH® LDM 6880

FOR ENVIRONMENTAL PROTECTION

WHAT IS MOWILITH® LDM 6880?

MOWILITH® LDM 6880 is an organic additive that has been especially developed for the production of liquid-proof concrete and to meet the strict safety requirements in connection with water protection.

MOWILITH® LDM 6880 is therefore being used for the production of liquid-proof concrete in accordance with the German Federal Water Act (WHG) and the ordinance on installations for handling substances hazardous to water (AwSV).



UNIQUE: OFFICALLY APPROVED BY DIBT

MOWILITH® LDM 6880 is officially approved by the German Institute for Building Technology (DIBt). The additive is marked with DIBt approval number „ETA-10/0374“.

Thus, it can be used in accordance to the German guideline "Concrete structures for the handling of water contaminating substances, Part 2" by the German Committee for Reinforced Concrete (DAfStb).

WHAT IS MOWILITH® LDM 6880 SUITABLE FOR?

MOWILITH® LDM 6880 is particularly suitable for concrete constructions having to meet strict requirements on the impermeability of concrete towards aggressive substances and on an optimised resistance to acids, salt solutions, fuels and other substances hazardous to water.

- ▶ For the production of liquid-proof concrete
- ▶ Increased impermeability of concrete
- ▶ Reduction of the penetration depth of substances hazardous to water
- ▶ Possible reduction of component thickness
- ▶ Improvement of the resistance of concrete to chemical substances
- ▶ Integral optimisation of concrete (sealing function of the entire cross section of the component)
- ▶ Reduction of construction time, as no further measures to increase the impermeability are necessary
- ▶ Verification of fuel flow in concrete around joints (concerning German regulation on technical specifications for the construction and operation of petrol stations TRwS 781)
- ▶ Increase in elongation at fracture

WHERE IS MOWILITH® LDM 6880 APPLIED?

MOWILITH® LDM 6880 can be used for various ready-mix and precast productions. Typical applications are:

- ▶ Liquid-proof and impermeable concrete intended to act as containment facilities and thus, as secondary barrier in systems for storing, decanting, manufacturing, handling and using water-hazardous materials, e.g. drainage areas, collection chambers, and foundation slabs etc.
- ▶ Concrete areas at petrol stations
- ▶ Fueling and filling areas
- ▶ Sewage pipes and sewers
- ▶ Production facilities for chemicals
- ▶ Automobile productions



MOWILITH® LDM 6880

FOR LIQUID-PROOFED CONCRETE

WHAT DOES „LIQUID-PROOF“ ACTUALLY MEAN?

The impermeability of a concrete structure in connection with substances hazardous to water is linked to two factors: 1. Based on a static design the structure must be free of cracks 2. The concrete must be suitable as a building material and must present a uniform impermeability.

VERIFICATION OF IMPERMEABILITY

The design of catch basins in accordance to the German Federal Water Act (WHG) applies to the German guideline "Concrete structures for the handling of water contaminating substances" by the German Committee for Reinforced Concrete (DAfStb).

According to this guideline, the verification of impermeability must be provided by two separate analyses:

1. Stress analysis or compression zone analysis
2. Penetration depth analysis in the total cross-section or the uncracked pressure zone.

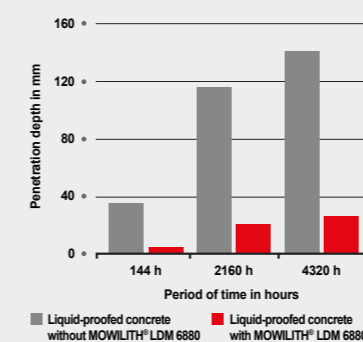
The planner must demonstrate the impermeability of the concrete structure towards substances hazardous to water and for the maximum possible exposure time.

UP TO 64% IMPROVEMENT IN PENETRATION DEPTH

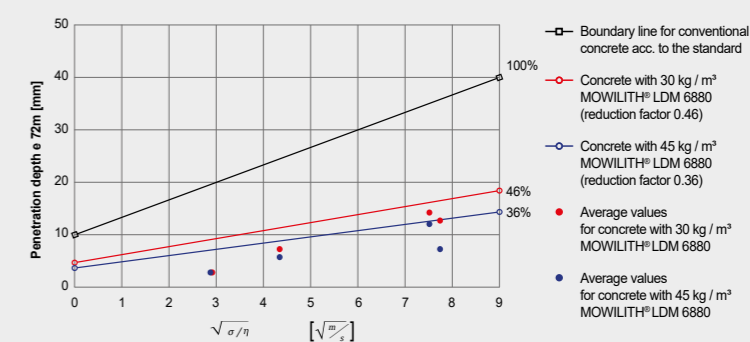
Modifying the concrete with MOWILITH® LDM 6880 results in a significantly improvement of impermeability and resistance to chemical substances. Testing in accordance to the German DAfStb directive at the Technical University Darmstadt showed significantly reduced penetration depths compared to a reference liquid-proofed concrete.

Depending on the added amount of MOWILITH® LDM 6880, the depth of penetration of substances hazardous to water can be reduced by up to 64 percent.

PENETRATION DEPTH



BOUNDARY LINE FOR EXPOSURE PERIOD OF 72h





MOWILITH® LDM 6880

FOR IMPROVED IMPERMEABILITY & STRENGTH

YOUR PLANNING SECURITY: VERIFICATION OF IMPERMEABILITY

Furthermore, the compression zone analysis offers clear planning security on the reduction in penetration depth by adding MOWILITH® LDM 6880, since, in the event of an incident, a maximum penetration depth is significantly reduced. This does also apply to the simplified verification of impermeability.

ANOTHER BENEFIT: MEETS REQUIREMENTS ON JOINT-SEALING

According to the German DAfStb guideline, "Concrete structures for the handling of water contaminating substances", concrete structures at joint must be liquid-proof, and the penetration depth of test liquids must not be greater than 2/3 of the area that is protected by the joint sealant in the joint flank for the duration of the entire leakage test.

This requirement is met by significantly improving the impermeability of the liquid-proof concrete with MOWILITH® LDM 6880.

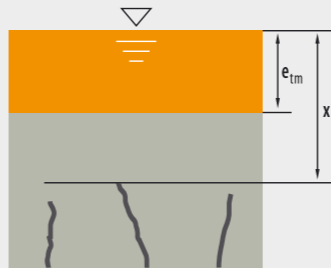
INCREASED STRENGTH ALLOWS STRUCTURAL DESIGN FOR UNCRACKED CONCRETE

Liquid-proof concrete treated with MOWILITH® LDM 6880 has an increased bending tensile strength. This can have positive effect on the structural design calculation and allow to provide the proof of uncracked concrete required by the DAfStb directive guideline.

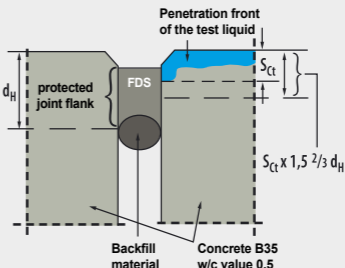
TYPE STATICS FOR CARRIAGEWAYS

The favorable tension behavior of the MOWILITH® LDM 6880 high-performance concrete allows for a production of carriageway slabs (depending on the dimensions) without minimum reinforcement for petrol station areas. An approved type statics with corresponding verification of impermeability is available upon request.

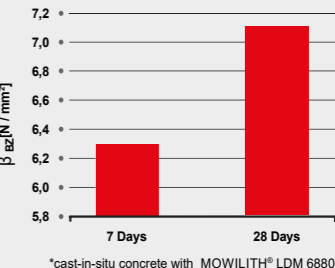
COMPRESSION ZONE ANALYSIS



JOINT TIGHTNESS



BENDING TENSILE STRENGTH*



MOWILITH® LDM 6880

FOR ENHANCED DURABILITY

IMPROVED RESISTANCE TO ACIDS

For corrosive liquids, DAfStb guideline allows to set the average depth of damage of liquid-proof concrete at 5 mm after 72h.

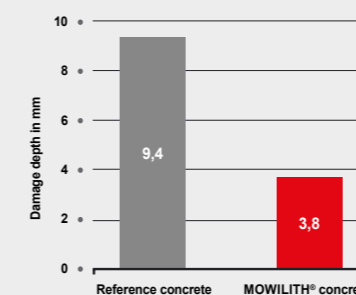
Increasing the impermeability of concrete using MOWILITH® LDM 6880, improves also the resistance to inorganic and organic acids, such as biogenic Sulfuric acid.

Studies carried out by the Technical University of Hamburg-Harburg confirm that concrete modified with MOWILITH® LDM 6880 shows a significant improved resistance to sulfuric acid attacks over an exposure period of 400 days. The test results are shown in the graphic below.

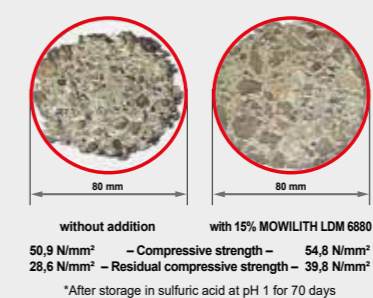
OPTIMISED PROTECTION AGAINST CARBONATION

In addition to the high level of impermeability, concrete optimized with MOWILITH® LDM 6880 offers another benefit: the reduction of the progressive carbonation. The significant improvement of the carbonation depth compared to the reference concrete is shown in the diagram below.

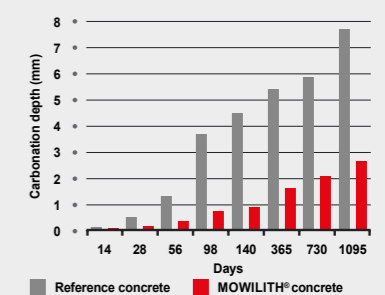
RESISTANCE TO ACIDS



RESISTANCE TO ACIDS



CARBONISATION REDUCTION





MOWILITH® LDM 6880

CONCRETE PRODUCTION & WORKABILITY

PRODUCTION & WORKABILITY

The modified liquid-proof concrete can be easily produced, pumped with conventional construction equipment and processed conventionally. MOWILITH® LDM 6880 reduces the bleeding of concrete and features plasticizing effects that further on improve the workability and the w/c ratio of concrete.

Therefore, when determining the w/c ratio, MOWILITH® LDM 6880 must be taken into account at a 100%. MOWILITH® LDM 6880 is added to the premixed concrete. It is important to ensure a thoroughly distribution and mixing. The mixing time, however, must be in accordance with the mixing instructions of DIN EN 206-1 and DIN 1045-2.

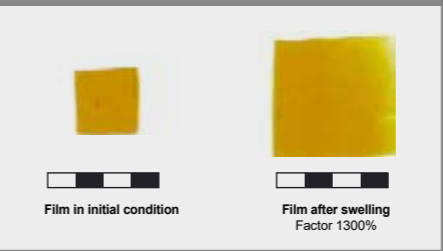
HOW IT WORKS

The polymers, which are finely distributed within the dispersion, embed in the gel and capillary pores that arise from the setting of concrete. When water removes as a result of cement hydration and hardening, these small polymer particles form a fine film in the pore space. In doing so, they increase the impermeability of the solid structure (Cement hardens with water absorption, dispersion with water release).

Some chemical media, e.g. methylene chloride, can make the small polymer particles swell – and thus, reduce the pore volume again sometimes, depending on the media, up to partial occlusion.

To conclude, MOWILITH® LDM 6880 significantly improves the impermeability and resistance of concrete to chemical substances.

SWELLING BEHAVIOUR IN METHYLENE CHLORIDE



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