

Bermocoll in construction industry



Contents



Bermocoll makes a difference	4
Applications	6
Functions	8
Bermocoll in tile adhesive	10
Bermocoll in plaster	12
Bermocoll in joint filler	14
Rheology/Viscosity	16
Aqueous solutions of Bermocoll	18
Better performance with Bermocoll	20
Main types of Bermocoll	22
Your choice	24
About us	25



Bermocoll makes a difference

Wood and plant fibers are mostly made up of cellulose which is a natural polymer. When we make Bermocoll the cellulose reacts with the substituents, such as methyl, ethyl and hydroxyethyl. This process, called etherification, makes Bermocoll water soluble.

Bermocoll may be used in many different applications. By combining the parts of the substituents in various ways we are able to customize the properties of Bermocoll to fit individual needs.

We divide Bermocoll into two different categories depending on the way the Bermocoll is customized. You can see the simplified chemical structures of these two categories of Bermocoll in the diagram to the right.

We want everything in which Bermocoll is used to last a long time. It is a very important component in building products and we add it in order to increase water retention, to give a suitable consistency and to improve adhesion in cement and gypsum-based systems.

Bermocoll is a non-ionic cellulose ether. We produce it in varying grades of viscosity in order to meet the solubility requirements of the applications. The grades are available in several different particle sizes such as powder, fine powder and extra fine powder. We can also tailor-make Bermocoll to meet individual needs and specifications.

EHEC

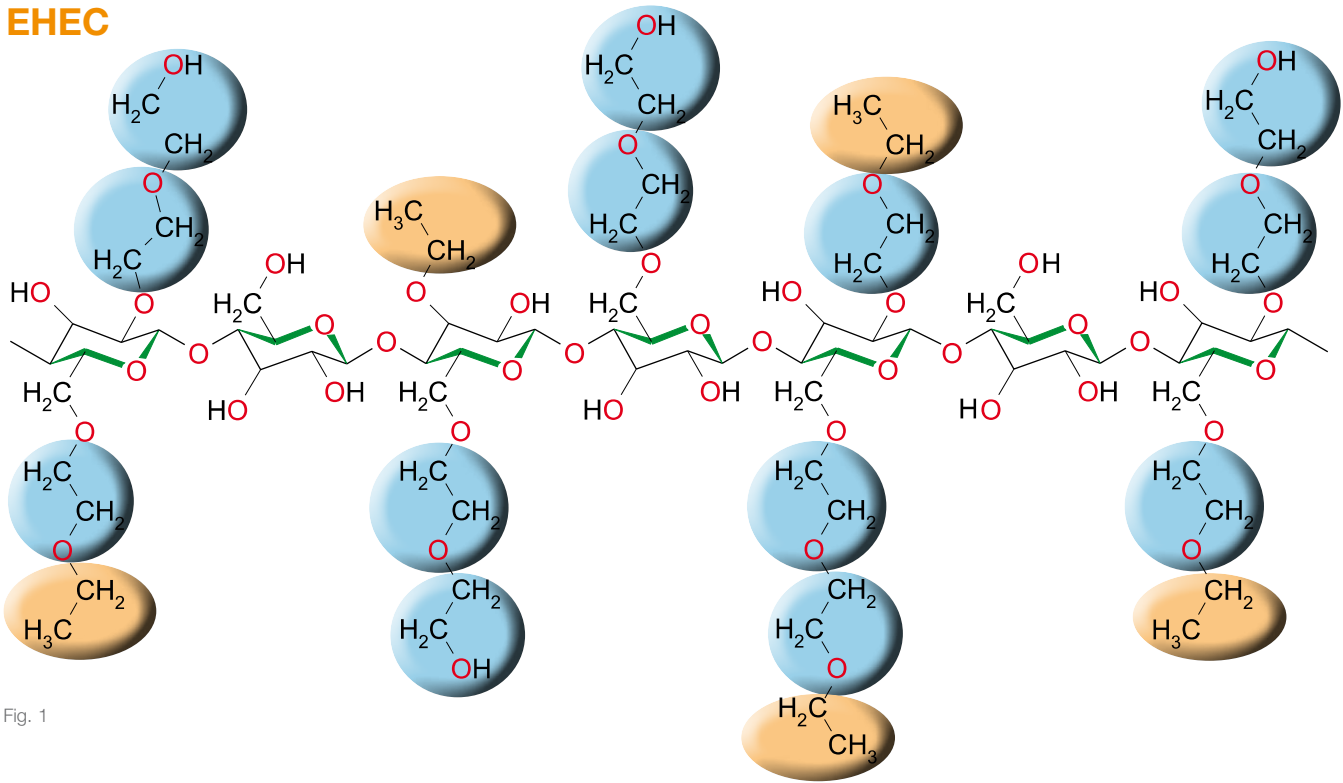


Fig. 1

Bermocoll for building applications

Bermocoll E – an Ethyl Hydroxyethyl Cellulose (EHEC).

Bermocoll M – a Methyl Ethyl Hydroxyethyl Cellulose (MEHEC), the only one of its kind on the market.

Bermocoll CCA – specially developed for different applications based on the EHEC technology.

Bermocoll BCM/CCM/ML – specially developed for different applications based on the MEHEC technology.

MEHEC

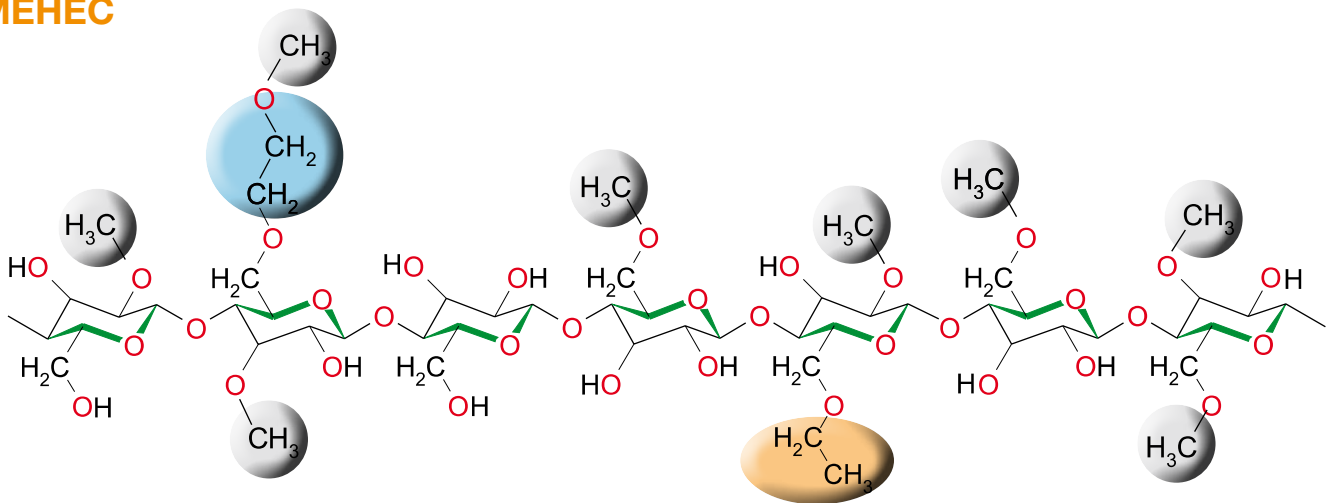


Fig. 2

Applications



Our Bermocoll cellulose ethers are compatible with a wide range of binders, fillers, polymers, and surfactants used in building materials.

The characteristics of mortars are dependent on a large number of interacting factors such as quantity, quality, source of raw materials, particle size of binders, amount of water, etc.

Building products contain one or a combination of binders, fillers and additives.

Binders

Cement

The type of cement and the amount used affect the properties of the mortar. With a high cement content, the strength of the mortar is increased and setting time is reduced.

Gypsum

The grade of gypsum varies depending on the source, level of impurities, method of production, etc. A retarder is generally needed to prolong the setting time.

Lime

Lime is often used in combination with cement or gypsum to improve workability, flexibility and to prevent cracking.

Latex

Latex can be used as the sole binder in tile adhesive or in a ready-to-use joint filler. It can also be used as an additive in cement or gypsum-based mortars.

Fillers

Fillers consist of an inert material and are used to improve the properties of the system in which they are used. Examples of fillers:

- Quartz sand
- Silica flour
- Limestone
- Calcium carbonate

Additives

Additives which also optimize mortar formulations are:

- Water retaining agent
- Redispersible powder
- Air entrainer
- Pre-thickener
- Hydrophobic agent
- Preservative
- Retarder/Accelerator



Examples of applications where Bermocoll makes a difference:

Tile adhesive

Plaster:

- Gypsum-based
- Cement-based

Joint filler:

- Gypsum-based
- Dispersion-based

Others:

- EIFS
- Floor screed
- Miscellaneous applications



Functions

Water retention

We think that working with Bermocoll should be simple. Since Bermocoll has excellent water retention we are able to delay the rapid escape of water into nearby absorbent substrates. We also use Bermocoll to control consistency making it more easily workable. With Bermocoll we are also able to extend open time and enhance adhesion.

Water retention capacity

Bermocoll's excellent water retention properties are dependent upon many factors. These factors include the levels of viscosity and solubility as well as the surrounding temperature and particle size. Different amounts of Bermocoll may be used depending on the absorbency of the substrates, mortar composition and layer thickness. It is also important to know that the particle size distribution of Bermocoll may also affect water retention capacity. If we use a more finely ground grade of Bermocoll, one which dissolves more rapidly than coarser grades, the water retention is improved.

Consistency, workability and stability

Bermocoll has excellent rheological properties. These properties improve the consistency, workability and stability of cement and gypsum-based mortars.

When we use a substitution of both ethyl and hydroxyethyl groups Bermocoll takes on a surface-active character. This characteristic stabilizes the small air bubbles in the mortar that work as a lubricant between the solid particles.

Modified Bermocoll grades

Modified Bermocoll grades, such as CCA, BCM, ML and CCM, need more water. This gives greater bulk, improved cohesion and reduces sagging of the wet mortar.

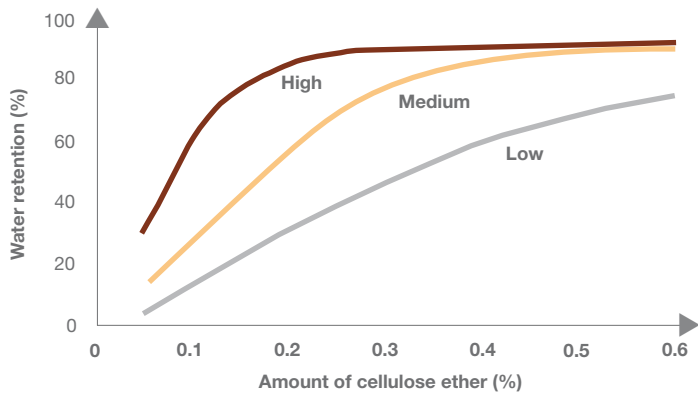


Fig. 3
Water retention capacity of Bermocoll depending on viscosity.



Difference in consistency in a standard CTA formulation between a CCM grade and a standard grade.

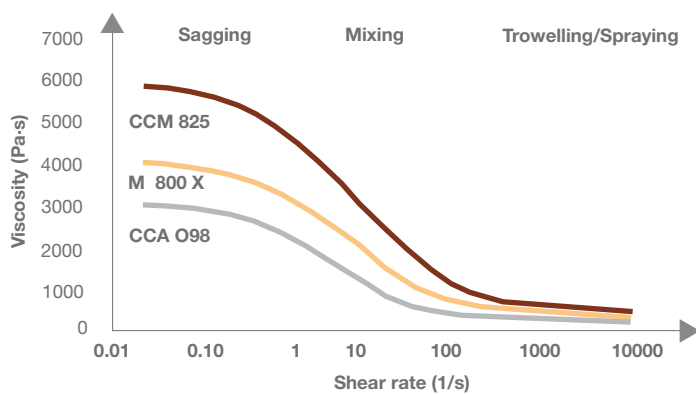


Fig. 4
Rheological properties of Bermocoll.

Bermocoll is added to give properties such as:

- Water retention
- Uniform consistency
- Easy workability
- Excellent stability
- Extended open time
- Uniform setting
- Better adhesion
- Improved strength



Bermocoll in tile adhesive

The binder in tile adhesive is either cement or latex. Tile adhesive with latex as the binder is delivered “ready to use”. Besides binder, tile adhesive contains filler, cellulose ether and other additives in order to enhance different properties of the mortar.

The amount of binder in cement-based tile adhesive is usually around 20–40% and approx. 10% in a latex-based tile adhesive. In order to increase the flexibility of cement-based tile adhesive, combinations of cement and a small amount (0.5–5%) of redispersible powder are used.

Highly modified low/medium viscosity Bermocoll makes it possible to formulate high-quality tile adhesives (type C2).

Three typical tile adhesive formulations

A comparison between three different mortars was made (fig. 5 and 7). Two of them according to the standards and one formulation with a low amount of cellulose ether and binder (table 1). The latter formulation does not meet the requirements of the standards.

Classification of tile adhesives according to ISO 13007, EN 12002 and EN 12004

Tile adhesives are classified in categories depending on how well they meet the requirements of the standard. The table shows an extract of the codes used to describe a mortar (in terms of reduced slip, open time and tensile strength). More details about the classification of a mortar can be found in ISO 13007, EN 12002 and EN 12004. (See page 19 for web addresses.)

Bermocoll, the most important additive ensures:

- Good workability
- Good tensile strength
- Long open time
- No slip with modified grades

Three typical tile adhesive formulations					
Type (Parts by weight)	Bermocoll	Cement	Quartz sand (0-0.5 mm)	Quartz sand (0-0.3 mm)	Re-disp. powder
Base	2.5	300	700	–	–
Medium (C1T)	4.0	300	350	350	6
Flexible (C2T, C2TE)	5.0	320	300	340	40

Table 1

The following Bermocoll grades are recommended for tile adhesives					
Type	Bermocoll	App. Viscosity 1% (mPa-s)	Particle size	Modified	Type of CTA
Base (C1, C1T)	M 70	7000	Powder	No	Low cost
Base (C1, C1T)	M 800 X	11000	Fine powder	No	Low cost
Base (C1, C2)	CCA 098	9000	Powder	Surfactant	Floor
Base, Medium (C1, C1T)	CCM 825	11000	Fine powder	Yes	Medium non-slip
Medium (C1T)	M 30	3000	Powder	No	Medium quality
Medium (C1T, C2T)	ML 31	3500	Powder	Yes	Medium quality
Flexible (C1T, C2T, C2TE)	ML 11	1200	Powder	Yes	High tech

Table 2

Code	Explanation
C:	Cementitious adhesives
1:	Normal adhesive
2:	Improved adhesive
T:	Adhesive with reduced slip
E:	Adhesive with extended open time
S1*	Transverse deformation $\geq 2.5 - < 5$ mm
S2*	Transverse deformation ≥ 5 mm

*Acc. to EN 12002

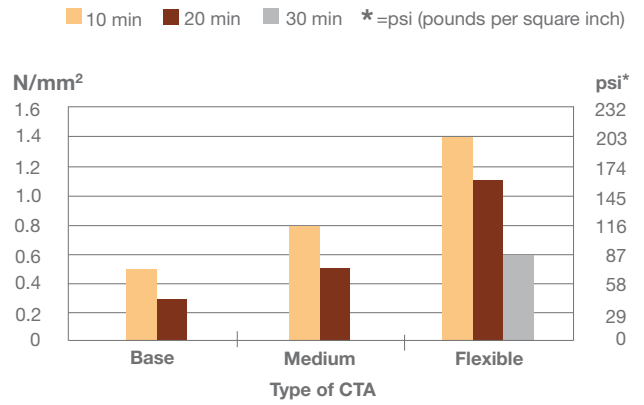


Fig. 5

Open time EN 1346 (20 min).

The differences in open time are shown in the graph as tensile strength. The best adhesion is achieved in C2TE mortar (extended open time). This mortar contains a low/medium viscous Bermocoll and a high amount of redispersible powder.

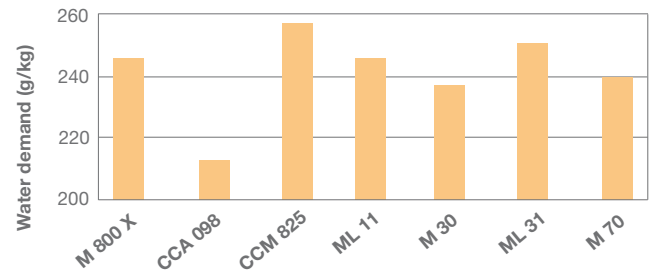


Fig. 6

Water demand in a standard formulation.

The adjacent graph gives an indication of the water demand for different Bermocoll grades. Degree of modification has a large influence on the water demand and does not follow the water viscosity due to interaction of the modifier with filler and binder.

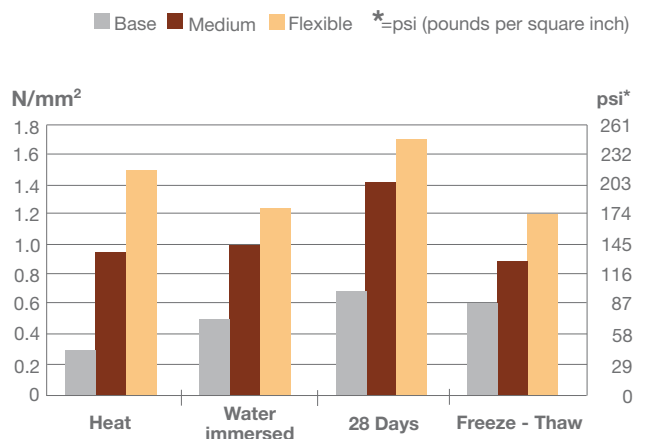


Fig. 7

Tensile adhesion strength (EN 1348).

The graph shows tensile strength under four different storage conditions. The C2TE mortar has the best strength.



Bermocoll in plaster

Plasters are applied in layers from a few tenths of a millimeter up to 40 mm.

Different application methods are used and the plaster can be applied indoors or outdoors. This places great demands on the cellulose ether as well as on the other raw materials and additives.

The plasters can be divided into groups according to the type of binder used and also by application method, (manually or machine applied). There is always a suitable Bermocoll for your purpose.

Projection plaster

Projection plaster is generally applied with a continuous plaster machine where the dry mix and the water are mixed instantaneously before the plaster is sprayed on the wall. Since the time between mixing and application is very short (approx. 30 sec) the cellulose ether must have an extremely fast dissolving time.

During this short period of time the right consistency, to prevent sagging, must also be achieved. The plaster is often applied in a layer of 10–20 mm in thickness and is levelled, sponged and steel trowelled according to different procedures.

Hand plaster

Since hand plaster is mixed in batches, dissolution speed is not as important as in the case of projection plaster. This means that other types of Bermocoll are preferred. The addition level of Bermocoll is somewhat lower for hand plaster than for projection plaster.

Finishing/Skim coat/Satin

This kind of plaster has many different names and its purpose is to create the best surface finish possible. The plaster is applied by hand in layers down to 0.5 mm in thickness.

Bermocoll in plaster provides:

- Water retention
- Workability
- Sag resistance
- Adhesion to substrate

Water retention

The water retention of a plaster is influenced by the same factors as other mortars. Since plasters in some cases are applied under extreme conditions on the building site with respect to temperature and wind, this has to be taken into consideration when the type and amount of cellulose ether is chosen.

Stability in elevated temperatures

Bermocoll has remarkably good stability in elevated temperatures. For example when dry mortar containing Bermocoll is stored at 100°C for 7 days, the water retention of the system decreases only marginally.

Recommended Bermocoll grades for gypsum-based plaster								
Type of plaster	Plaster thickness (mm)	Bermocoll	Bermocoll (%)	App. Viscosity (1%) mPa·s	Particle size	Modified	Solubility	Sag resistance
Hand	10 - 20	CCA 379	0.12 - 0.20	7000	Fine powder	High	Fast	Very high
Hand	10 - 20	CCM 879	0.10 - 0.18	11000	Fine powder	High	Fast	Very high
Projection	10 - 20	CCA 312	0.18 - 0.25	3000	Extra fine powder	Low	Extra fast	Moderate
Projection	10 - 20	CCA 612	0.18 - 0.25	6000	Extra fine powder	High	Extra fast	High
Satin	0.5 - 3	CCA 698	0.4 - 0.7	7000	Fine powder	Medium	Fast	High
Satin	0.5 - 3	CCM 894	0.3 - 0.6	11000	Fine powder	High	Moderate	High

Table 3

Recommended Bermocoll grades for cement-based plaster								
Type of plaster	Plaster thickness (mm)	Bermocoll	Bermocoll (%)	App. Viscosity (1%) mPa·s	Particle size	Modified	Solubility	Sag resistance
Base coat	10 - 15	M 10	0.02 - 0.05	1000	Powder	No	Fast	
Thin plaster	3 - 6	M 800 X	0.15 - 0.3	11000	Fine powder	No	Fast	
Thin plaster	3 - 6	CCM 825	0.15 - 0.3	11000	Fine powder	Low	Fast	Moderate
Skim coat	< 3	M 30	0.2 - 0.4	3000	Powder	No	Fast	
Skim coat	< 3	M 70	0.15 - 0.3	7000	Powder	No	Fast	
Skim coat	< 3	M 800 X	0.15 - 0.3	11000	Fine powder	No	Fast	
Projection/ machine	> 10	ML 11	0.1 - 0.14	1200	Powder	Low	Fast	Moderate
Projection/ machine	> 10	ML 21	0.1 - 0.14	2000	Powder	Low	Fast	Moderate

Table 4

Bermocoll in joint filler

Joint fillers are generally used between gypsum boards in combination with paper strip as reinforcer to give a strong and even surface for further processing with a finishing plaster, paint or wallpaper.

The joint filler is either based on gypsum or latex as binder. The advantage of using gypsum-based joint filler is that the setting time can be controlled and shrinkage is kept to a minimum. Latex-based has the advantage of ready to use when it is delivered as a paste, no mixing procedure at the building site.

Choosing the right Bermocoll

Gypsum

For gypsum-based systems, the choice of Bermocoll is dependent on the quality of the gypsum, purity, particle size, water demand and the character of the surface structure. It is very important that the right consistency and optimal mixing qualities are achieved in the gypsum-based joint filler. These demands are satisfied by choosing the right Bermocoll.

Latex-based

Different grades of Bermocoll provide different characteristics. They give excellent wet mixing and application properties. When choosing a non modified Bermocoll quality, the use of a pre-thickener such as Attagel or Bentonite may be needed.

Mixing

All grades recommended for dispersion-based joint filler have a pH dependent dissolving behaviour. This means that the cellulose ether can be dispersed in the mixing water if it is kept at pH 7 or below. The other wet ingredients are then added to the mixing water followed by the dry raw materials.

Gypsum-based joint filler

	Parts by weight
Gypsum, hemi hydrate	760 - 997
Filler (calcium carbonate)	0 - 200
Hydrated lime	0 - 10
Re-disp. powder	0 - 30
Retarder	0.1 - 0.6
Bermocoll	3 - 6

Table 5

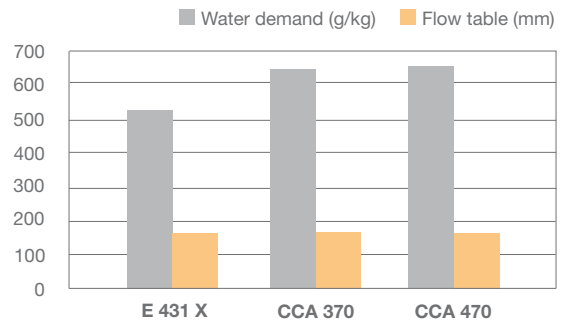


Fig. 8

Water demand vs. constant flow table for a gypsum-based joint filler.

Choosing the right Bermocoll

Bermocoll	Bermocoll (%)	App. Visc. 1% (mPa.s)	Particle size	Modified	Type of joint filler
E 431 X	0.3 - 0.5	2000	Fine powder	No	Gypsum-based
CCA 370	0.3 - 0.6	500	Fine powder	High	Gypsum-based
CCA 470	0.3 - 0.5	3000	Fine powder	High	Gypsum-based
EBM 5500	0.3 - 0.6	7000	Powder	No	Latex-based
CCA 098	0.3 - 0.6	9000	Powder	Surfactant	Latex-based
M 30 Q	0.3 - 0.6	3000	Powder	No	Latex-based

Table 6

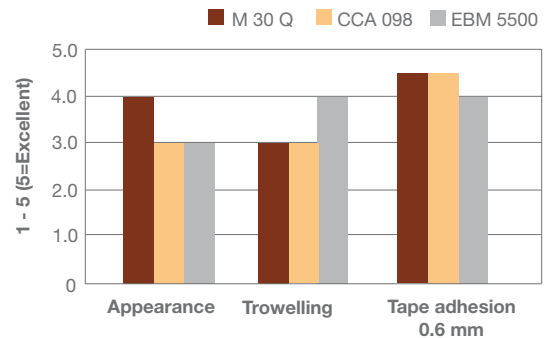


Fig. 9

Appearance of dispersion-based joint filler made with Bermocoll.

Selection of the polymer together with the right choice of Bermocoll for your dispersion-based system has a large impact on tape adhesion.

Dispersion-based joint filler

	Parts by weight
Latex (binder)	40
Defoamer	0 - 2
Dispersion agent	0 - 3
In-can preservative	1 - 4
Water	300 - 350
Filler (calcium carbonate)	960 - 990
Filler (silica flour)	5 - 15
Hydrated lime	1 - 3
Mineral thickener	1 - 3
Bermocoll	3 - 6

Table 7

Bermocoll in joint filler provides:

- Good water retention
- Easy leveling
- Smooth creamy consistency
- Control over setting time
- No shrinking
- Excellent tape adhesion
- Easy mixing
- Good workability
- Sag resistance
- Good adhesion to substrate



Rheology/ Viscosity

The viscosity of Bermocoll is in general determined in a 1% solution using a Brookfield LV at 12 rpm and with spindles 1–3 at 20°C. Low viscous products such as E 230 – E 351 are measured in 2% solutions. The solutions of Bermocoll are non-Newtonian – pseudoplastic, which means that the viscosity decreases as the shear rate increases. This is why the shear rate must be taken into consideration when measuring and comparing viscosities.

Modification of Bermocoll enhances the rheology

Modified Bermocoll is often used in building formulations to improve the rheology and to enhance other qualities of the mortar. The yield of a plaster can also be affected in a positive way. This is achieved via interactions between binders, fillers and the type of modification of the Bermocoll grade.

Viscosity in water and in gypsum mortar

When measuring the viscosity in water the Bermocoll shows nearly the same viscosity level regardless of the degree of modification.

The difference in viscosity in a gypsum mortar is on the other hand dependent on the degree of modification.

The viscosity will be significantly higher especially at low shear rates for highly modified grades.

The products are measured with a Helipath at two different shear rates at a constant water level. The water viscosity is measured on 1% solution with a Brookfield LV. (See fig.11.)

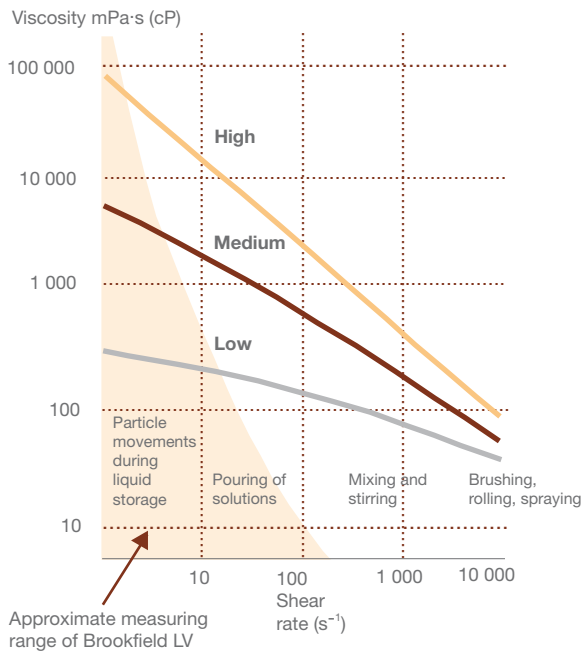


Fig. 10
Rheological behavior of BERMOCOLL.
 The graph shows the viscosity of 2% solutions of low, medium and high viscosity types of Bermocoll in water.

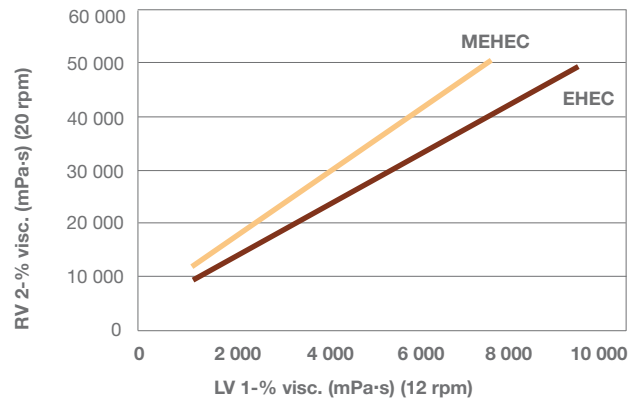


Fig. 12
Comparison of Brookfield viscosity methods.
 The graph gives an approximation between Brookfield LV in 1% solution and Brookfield RV in 2% solution (20°C).

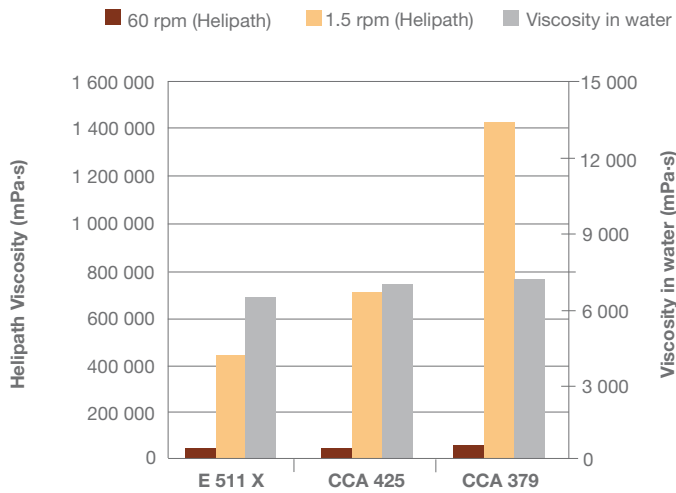


Fig. 11
Viscosity in water compared to a gypsum mortar.
 The graph shows the difference in viscosity between Bermocoll E and CCA grades in mortar and 1% solution in water.



Aqueous solutions of Bermocoll

Bermocoll undergoes rigorous quality control before delivery. The most important qualities for products that are used in building formulations are viscosity (water retention), dissolving behavior and rheological characteristics. There is no direct correlation between water viscosity and consistency or the rheology of the formulation, especially not for modified grades where the additive interacts with binder and filler.

Preparation of aqueous solutions

Bermocoll is normally blended into a dry mix. Since Bermocoll is a very fine powder with at times an admixture of other additives, as in modified grades, it can be difficult to make aqueous solutions. The following procedure is recommended when preparing a water solution of Bermocoll.

FQ qualities can be dispersed in cold water with a pH \approx 7. When the pH is raised to approx. 8–9 the Bermocoll dissolves.

X qualities are dispersed into a smaller amount of water (approx. 1/5 of the total amount) at a temperature of $>85^{\circ}\text{C}$. The system is then diluted with cold water to the right concentration.

Modified Bermocoll qualities are dispersed in a solvent $<5\%$ (e.g. acetone) and then diluted with cold water.

All these dissolving procedures require continuous stirring until the Bermocoll is completely dissolved.

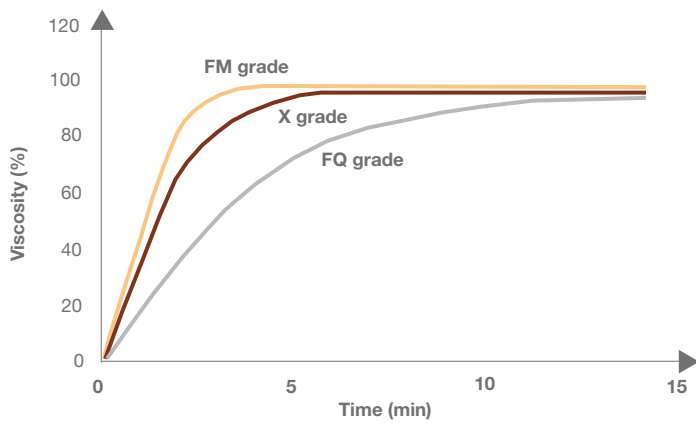


Fig. 13
Dissolving behavior.
 The graph shows different dissolving behaviors for different Bermocoll grades.



Dissolving characteristics in water

In certain applications, such as a machine plaster, very fast dissolution is essential. In most hand-mixed products the opposite is often required. The dissolving time is measured according to test method CCD 2807, which is available on request.

Standards

For nearly all mortars there are both national and international standards.

The following standards describe some of the requirements for tile adhesives: ISO 13007, EN 12002, EN 12004, ASTM 118.1 and ASTM 118.4.

The most essential requirement is tensile strength in relation to a minimum of slip. In the ASTM standard the strength is specified as shear strength. There are also a number of standards for plaster.

Besides these standards there are a number of in-house methods, which are described in CCD documents. These documents can be ordered.

Recommended web addresses:

EN standards: <http://www.cen.eu>
ISO standards: <http://www.iso.ch>
ASTM standards: <http://www.astm.org>
ANSI standards: <http://www.ansi.org/>

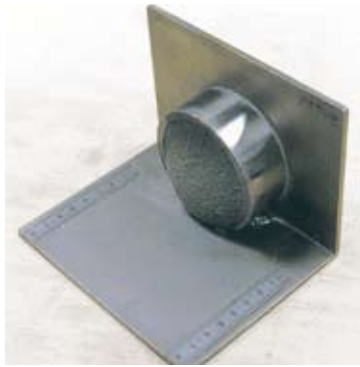


Better performance with Bermocoll

A number of test methods, not only standard methods, have been used to evaluate the performance of Bermocoll. Consistency tests indicate the rheology and can be interpreted by a skilled technician. Adhesion strength and water retention tests are very objective and are not judged in the same way.

Ring test

An open cylinder is attached to two perpendicular steel plates. The cylinder is filled with mortar and the apparatus is turned 90°. The mortar flow is recorded after 15 minutes.



Ring test

Slip (according to EN 1308)

The slip rate (by their own weight), of hard burned tiles is determined on a vertical concrete slab. The tile is loaded with 5 kg, after 2 minutes, for 30 seconds.



Slip

Setting time

The VICAT instrument needle is allowed to drop into the mortar every 10 to 15 minutes to record the setting characteristics.



Setting time

Flow table

A cone placed on a movable table is used as a mould and filled with mortar. The cone is removed and the table is raised and lowered 15 times in about 15 seconds. Diameter measurements of the mortar are then carried out.



Flow table

Open time

Tiles are applied to the mortar after different ageing times. Each tile is loaded with 1 kg for 30 seconds. After 15 minutes the coverage is determined (40% coverage is required for a tile to be open).



Open time

Tensile strength (according to EN 1348) Tiles, 50x50 mm, complying with EN 176 are applied to the mortar after 5 minutes and loaded with 2 kg for 30 seconds. The tensile adhesion strength is measured after the slabs have been stored according to EN 1348.



Tensile strength

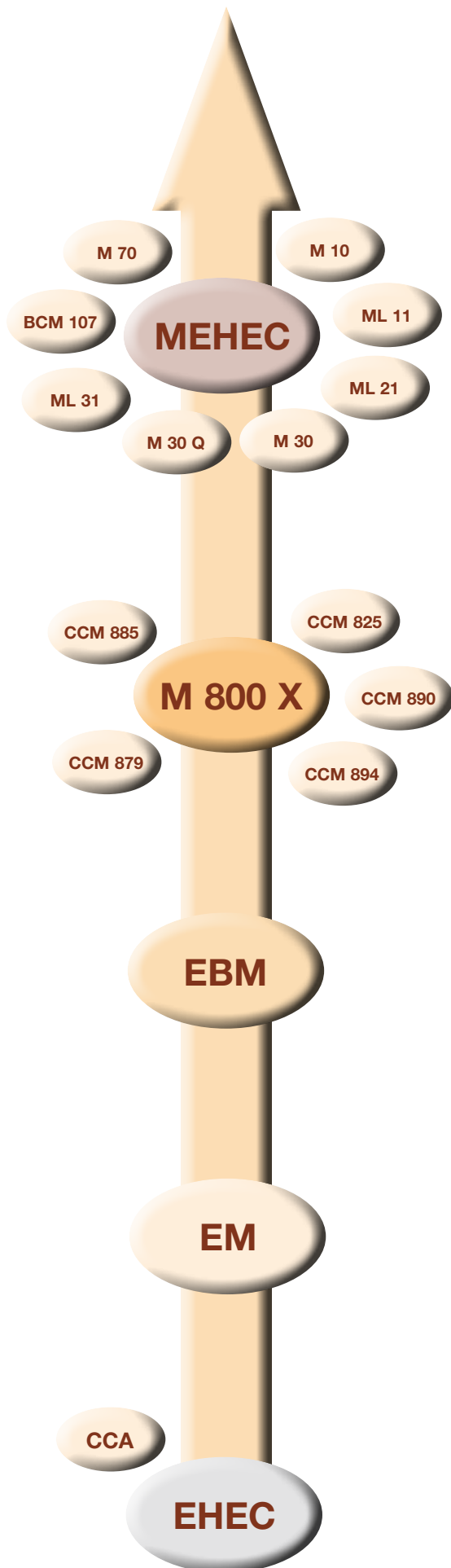
Water retention/Water loss

A cup, which can be drained from the bottom, is filled with mortar. The mortar is evacuated for 10 minutes at 50 mm Hg. Water retention is expressed as water loss from 1 kg of wet mortar, or as a percentage of water retained.



Water retention/Water loss

Main types of Bermocoll



The arrow is related to the methyl degree of substitution. Presently there are five main product groups suitable for different building applications. We continuously develop new products based on our M technology, finding the right balance between methyl, ethyl and ethyl hydroxyl ethyl groups.

EHEC and CCA contain no methyl and are pure ethyl hydroxyl ethyl cellulose and can be used in most building applications.

EM and EBM are developed for dispersion based formulations and contain a small amount of methyl groups. They are treated in order to dissolve smoothly in water without lump formation. EBM grades are low foaming with good storage stability.

M 800 X based products are highly efficient and intended for gypsum applications with excellent water retention and application properties.

MEHEC has the highest methyl substitution and is used in all cement based applications. Bermocoll M provides the best balance of the two most important properties; workability and strength.

Degree of modification

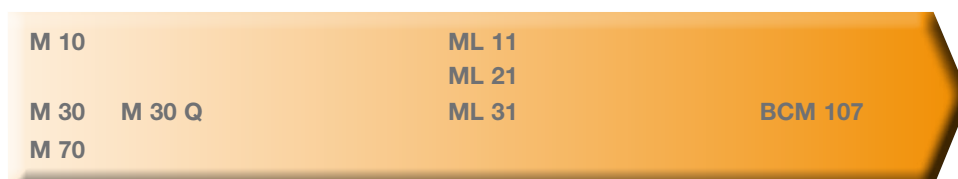
Non modified

High modified



Non modified
Low viscosity

High modified



High viscosity

Degree of substitution (guideline value)				
Bermocoll				
Type	MS _{EO}	DS _{Ethyl}	DS _{Methyl}	
E 230 – E 511	1.9	0.9	–	
M 10 – M 70	0.25	0.15	1.30	
M 800	1.1	0.3	0.8	
EBM 5500	2.4	0.4	0.5	
Bermocoll				
Type	App. viscosity mPa·s (cP) (Brookfield viscometer type LV)			
	1% conc	(20°C)	2% conc	(20°C)
E 230			300	2-12*
E 320			2200	2-12*
E 351			5000	3-12*
E 411	1000	2-12*		
E 431	2000	2-12*		
E 451	3000	3-12*		
E 481	5000	3-12*		
E 511	7000	3-12*		
M 10	1000	2-12*		
M 30	3000	3-12*		
M 70	7000	3-12*		
M 800	11000	4-12*		
EBM 5500	5500	3-12*		

*Spindle code - speed (rpm)

Your choice

The chart below highlights the most recommended grades for different applications

	Gypsum-based					Cement-based							Latex-based				Physical properties						Comments						
	Projection plaster	Hand plaster	Satin plaster	Joint filler	Glue	Projection plaster	Skim coat	Tile adhesive	Grout	Aerated concrete glue	Brick mortar	Floor screed	Extrusion mortar	EIFS	Masonry cement	Tile adhesive	Joint filler	Sand paint	Textured coating	Powder (F)	Fine powder (X)	Extra fine powder (FM)		Treatment	Low modified	Medium modified	High modified	Viscosity	
E 230 X																				X								Very low	
E 351 X		○		○											●					X								Low	
CCA 098						○	●													X		X						High	Surf.
CCA 312	●					○																X			X			Medium	
CCA 328				●	●																X					X		High	
CCA 370				●																	X					X		Low	
CCA 379		●			○																X					X		High	
CCA 425			●			○	●							○							X			X				High	
CCA 470				●																	X					X		Medium	
CCA 612	●																					X				X		High	
CCA 698		○	●																		X					X		High	
EBM 5500																●	●	●	●	X			X					High	
M 800 X							●														X							Very high	
CCM 825							●														X		X					Very high	
CCM 879		●			○																X					X		Very high	
CCM 885		●																			X					XX		Very high	
CCM 890				○																	X				X			Very high	
CCM 894			●		○																X					X		Very high	
M 10						●	●	●	●	●					●						X							Medium	
M 30						●	●	●	●												X							High	
M 70						●	●	●													X							High	
M 30 Q												●				●					X			X				High	
ML 11						●	●	●													X			X				Medium	
ML 21						●															X			X				Medium	
ML 31							●														X			X				High	

- Suitable
- Specially recommended

Particle sizes

To satisfy solubility requirements in varying applications, Bermocoll grades are available in the following particle sizes: F = powder, X = fine powder, FM = extra fine powder. These grades are intended for dry mixing with other powder materials and should not be directly dissolved in water.

Most viscosity grades of Bermocoll E are also available in a specially treated version, FQ. The FQ types are easily dispersed in neutral or slightly acid water. They dissolve quickly in alkaline conditions, e.g. in the presence of cement/lime.

About us

Cellulosic Specialties

Our Bermocoll locations worldwide



- Head office
- Research and development
- Business and service centers
- Production site

www.bermocoll.com

Bermocoll® is a registered trademark in many countries.

Cellulosic Specialties – the small company with multinational resources

Cellulosic Specialties is part of AkzoNobel Functional Chemicals, one of the business units within AkzoNobel. We have a unique technology base and experience of cellulose derivatives, with more than 50 years of development, manufacturing and sales of these products.

Today, our customers can be found in more than 90 countries. The combination of a multinational group's large resources and a small company's close proximity to its customers has given us a unique position. Our research and product development has always been guided by our customers and their requirements. We want you to look upon us as a responsive and responsible business partner, and to regard us as your preferred supplier of cellulosic specialties.

Tomorrow's Answers Today

At AkzoNobel, we believe the future belongs to those smart enough to challenge it. We believe that real progress belongs to those who not only think with courage, but also have the courage to deliver on the thought. Tomorrow's answers, delivered today. We are driven by the knowledge that what is good enough for our customers today may not necessarily be good enough for them tomorrow.

For a sustainable future

Another integral part of our daily work involves the protection of human and animal health and of the environment by ensuring that our products can be safely used throughout their entire lifecycle. Backed up by our commitment to Product Stewardship, Responsible Care® and Reach, we believe that supplying the right chemistry goes beyond just selling products.

Our efforts have been rewarded. Our Environmental Product Declaration (EPD) for Bermocoll M, based on life cycle analysis (LCA), has been reviewed and approved by an accredited certification body. The ISO 9001 and the ISO 14001 certification awarded for R&D, production, marketing and distribution of Bermocoll are only the first steps on the road to fulfilling our ambitions – to meet customers' request for competitive, environmentally sound, and profitable products today and tomorrow.

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