

# Technical Information

## Clay and earth building materials

---

### Table of contents – technical information:

Clay Undercoat Plaster, naturally-moist	p 2
Clay Undercoat Plaster, dry	p 3
Clay Finish Coat Plaster, naturally-moist	p 4
Clay Finish Coat Plaster, dry	p 5
Clay Fine-finish Plaster	p 6
Clay plaster for wall heating	p 7
Deco Clay Facing Plaster, coloured	p 8
Light unfired clay bricks NF 1200	p 9
Light unfired clay bricks 2 DF 700	p 10
Clay mortar, light	p 11
Compressed earth bricks	p 12
Clay mortar, dense	p 13
Rammed earth mix	p 14
Rammed earth screed mix	p 15
Earth for construction	p 16
Reed board 2 cm + 5 cm	p 17
Thermal conductivity + water vapour permeability	p 18

---

<b>Clay Undercoat Plaster</b>	naturally-moist	<b>05.001</b>
Properties / composition	Clay undercoat plaster is a naturally-moist material suitable for machine-processing made of crushed clay-rich earth, mixed-grade sand 0-2 mm and barley straw < 30 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1500 kg/m <sup>3</sup> .	
Supply form	Naturally-moist, packaged in 1 m <sup>3</sup> Big Bags	
Storage	Store dry. Can be stored outside for short periods when covered. Store Big Bags on pallets. Naturally-moist clay undercoat plaster should be used within 3 months of delivery.	
Coverage	1 m <sup>3</sup> naturally-moist clay undercoat plaster provides approx. 0.75 m <sup>3</sup> wet plaster. This will cover approx. 75 m <sup>2</sup> at a thickness of 1 cm.	
Application	A single-layer or multi-layer plaster for indoor use. Can be applied by hand or with a suitable machine. Suitable for levelling uneven surfaces and as undercoat plaster for light-clay panels, reed matting, masonry, etc. For machine application, mix with approx. 20% water using a normal paddle mixer or tumbler-mixer. Small quantities can be mixed by hand or with a hand-held motorised paddle mixer.	
Substrate	The substrate should be stable, clean, free of oily films and sufficiently roughened to provide a good key as clay plaster bonds only mechanically. Old clay plaster surfaces must be pre-wetted, other substrates need only be pre-wetted to prolong the workability of the material. Undercoat plaster is applied either with a trowel or sprayed on with a plastering machine. A single layer of up to 30 mm thickness is possible. Multiple layers are possible, e.g. interleaved with reinforcement mesh and scrim. Plaster bases such as reed matting must be dry. Old coats of paint must be removed completely.	
Working & drying time	Once mixed, wet plaster can be used for several days if kept under cover. Add additional water as necessary. As clay plasters contain organic material and are applied wet, poor ventilation can lead to slight mould formation. If this persists artificial forced drying should be considered. Once fully dry the plaster is not susceptible to mould growth.	

<b>Clay Undercoat Plaster</b>	dry	<b>05.002.1</b>
Properties / Composition	Clay undercoat plaster is a ready-mix preparation suitable for machine-processing made of crushed clay-rich earth, mixed-grade sand 0-2 mm and barley straw < 30 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1600 kg/m <sup>3</sup> .	
Supply form	25 kg sacks or packaged in 1 to Big Bags	
Storage	Store dry. If kept dry conluto clay undercoat plaster can be stored indefinitely.	
Coverage	25 kg clay undercoat plaster produces approx. 17 l wet plaster. This will cover approx. 1.7 m <sup>2</sup> at a thickness of 1 cm	
Application	A single-layer or multi-layer plaster for indoor use. Can be applied by hand or with a suitable machine. Suitable for levelling uneven surfaces and as undercoat plaster for light-clay panels, reed matting, masonry, etc. For machine application, mix with approx. 20% water using a normal paddle mixer or tumbler-mixer or use with enclosed plastering machine systems (e.g. G4 & G5 mixing pumps). Small quantities can be mixed by hand or with a hand-held motorised paddle mixer.	
Substrate	The substrate should be stable, clean, free of oily films and sufficiently roughened to provide a good key as clay plaster bonds only mechanically. Old clay plaster surfaces must be pre-wetted, other substrates need only be pre-wetted to prolong the workability of the material. Undercoat plaster is applied either with a trowel or sprayed on with a plastering machine. A single layer of up to 30 mm thickness is possible. Multiple layers are possible, e.g. interleaved with reinforcement mesh and scrim. Plaster bases such as reed matting must be dry. Old coats of paint must be removed completely.	
Working & drying time	Once mixed, wet plaster can be used for several days if kept under cover. Additional water may need to be added. As clay plasters contain organic material and are applied wet, poor ventilation can lead to slight mould formation. If this persists artificial forced drying should be considered. Once fully dry the plaster is not susceptible to mould growth.	

<b>Clay Finish Coat Plaster</b>	naturally-moist	<b>05.010</b>
Properties / composition	Clay finish coat plaster is a naturally-moist material suitable for machine-processing made of crushed clay-rich earth, mixed-grade sand 0-2 mm and barley straw < 8 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1500 kg/m <sup>3</sup> .	
Supply form	Naturally-moist, packaged in 1 m <sup>3</sup> Big Bags	
Storage	Store dry. Can be stored outside for short periods when covered. Store Big Bags on pallets. Naturally-moist clay finish coat plaster should be used within 3 months of delivery.	
Coverage	1 m <sup>3</sup> naturally-moist clay finish coat plaster provides approx. 0.75 m <sup>3</sup> wet plaster. This will cover approx. 75 m <sup>2</sup> at a thickness of 1 cm.	
Application	A single-layer or multi-layer plaster for indoor use. Can be applied by hand or with a suitable machine. Suitable for use on a clay undercoat plaster, all kinds of masonry and massive building materials. For machine application, mix with water using a normal paddle mixer or tumbler-mixer. Small quantities can be mixed by hand or with a hand-held motorised paddle mixer.	
Substrate	The substrate should be stable, clean, free of oily films and sufficiently roughened to provide a good key as clay plaster bonds only mechanically. Old clay plaster surfaces must be pre-wetted, other substrates need only be pre-wetted to prolong the workability of the material. The plaster is applied either with a trowel or sprayed on with a plastering machine. Layers of up to 10 mm thickness are possible when applied as a single layer. The surface finish can be varied depending upon when finishing work is undertaken. In general, finer textures can be achieved when the plaster is allowed to become dryer before being rubbed down with a sponge or float. Smooth finishes can be achieved by working over with a finishing trowel.	
Working & drying time	Once mixed, wet plaster can be used for several days if kept under cover. Add additional water as necessary. As clay plasters contain organic material and are applied wet, poor ventilation can lead to slight mould formation. If this persists artificial forced drying should be considered. Once fully dry the plaster is not susceptible to mould growth.	
Finishing	conluto clay finish coat plaster can be coated with casein distemper or silicate paint. Other paints and finishes are also possible provided that they are vapour permeable.	

<b>Clay Finish Coat Plaster</b>	dry	<b>05.011</b>
Properties / Composition	Clay finish coat plaster is a ready-mix preparation suitable for machine-processing made of crushed clay-rich earth, mixed-grade sand 0-2 mm and barley straw < 8 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1500 kg/m <sup>3</sup> .	
Supply	25 kg sacks or packaged in 1 to Big Bags	
Storage	Store dry. conluto finish coat plaster should be used within 3 months.	
Coverage	25 kg clay finish coat plaster produces approx. 16 l wet plaster. This will cover approx. 1.7 m <sup>2</sup> at a thickness of 1 cm.	
Application	A single-layer or multi-layer plaster for indoor use. Can be applied by hand or with a suitable machine. Suitable for use on a clay undercoat plaster, all kinds of masonry and massive building materials. For machine application, mix with approx. 20 % water using a normal paddle mixer or tumbler-mixer or use with enclosed plastering machine systems (e.g. G4 & G5 mixing pumps). Small quantities can be mixed by hand or with a hand-held motorised paddle mixer.	
Substrate	The substrate should be stable, clean, free of oily films and sufficiently roughened to provide a good key as clay plaster bonds only mechanically. Old clay plaster surfaces must be pre-wetted, other substrates need only be pre-wetted to prolong the workability of the material. The plaster is applied either with a trowel or sprayed on with a plastering machine. Layers of up to 10 mm thickness are possible when applied as a single layer. The surface finish can be varied depending upon when finishing work is undertaken. In general, finer textures can be achieved when the plaster is allowed to become dryer before being rubbed down with a sponge or float. Smooth finishes can be achieved by working over with a finishing trowel.	
Working & drying times	Once mixed, wet plaster can be used for several days if kept under cover. Additional water may need to be added. As clay plasters contain organic material and are applied wet, poor ventilation can lead to slight mould formation. If this persists artificial forced drying should be considered. Once fully dry the plaster is not susceptible to mould growth.	
Finishing	conluto clay finish coat plaster can be coated with casein distemper or silicate paint. Other paints and finishes are also possible provided that they are vapour permeable.	

## Clay fine-finish plaster

10.013

Properties / Composition	conluto clay fine-finish plaster is a ready-mix preparation suitable for machine-processing and is made of crushed clay-rich earth, mixed-grade sand 0-1 mm and fine organic fibres. It conforms to the German regulations DVL LR 3.9.
Supply	25 kg sacks or packaged in 1 to Big Bags
Storage	Store dry. If kept dry conluto clay fine-finish plaster can be stored indefinitely.
Coverage	25 kg conluto clay fine-finish coat plaster produces approx. 17 l wet plaster. This will cover approx. 6 m <sup>2</sup> at a thickness of 3 mm.
Application	A single-layer fine-finish plaster for indoor use. It can be applied to smooth surfaces including clay boards/panels or clay undercoat plaster; a clay primer should be used before plastering on other building boards. Expert advice should be sought before applying to older clay or earthen substrates. For machine application, mix with approx. 20 % water using a normal paddle mixer or tumbler-mixer or use with enclosed plastering machine systems (e.g. G4 & G5 mixing pumps).
Substrate	The substrate should be stable, clean, free of oily films and sufficiently roughened to provide a good key as clay plaster bonds only mechanically. Substrates need only be pre-wetted to prolong the workability of the material. The plaster is applied either with a trowel or sprayed on with a plastering machine. The plaster should be applied with a thickness of 2-3 mm. The surface finish can be varied depending upon when finishing work is undertaken. In general, finer textures can be achieved when the plaster is allowed to become dryer before being rubbed down with a sponge or float. Smooth finishes can be achieved by working over with a finishing trowel.
Working & drying times	Once mixed wet plaster can be used for several days if kept under cover. It may be necessary to add additional water.
Finishing	conluto clay fine-finish plaster can be coated with casein distemper or silicate paint. Other paints and finishes are also possible provided that they are vapour permeable.

<b>Clay plaster</b>	<b>for wall heating</b>
Properties / composition	<p>Clay undercoat and finish coat plasters are naturally-moist materials suitable for machine-processing made of crushed clay-rich earth, mixed-grade sand 0-2 mm and barley straw of different lengths: undercoat plaster &lt; 30 mm, finish coat plaster &lt; 8 mm. They conform to the German regulations DVL LR 3.9. Density = approx. 1500 kg/m<sup>3</sup>.</p> <p>Deco clay facing plaster is a thin-layer pre-coloured facing plaster made of naturally coloured earths and clays, mixed-grade coloured sands and quartz, grain-size &lt; 1 mm.</p>
Supply form	<p>Clay undercoat and finish coat plasters are naturally-moist and in 1 m<sup>3</sup> Big Bags.</p> <p>Deco clay facing plaster is a dry ready-mix preparation available in 25 kg sacks.</p>
Substrate	<p>The substrate should be stable, clean, free of oily films and sufficiently roughened to provide a good key as clay plaster bonds only mechanically. Old clay plaster surfaces must be pre-wetted, other substrates need only be pre-wetted to prolong the workability of the material.</p>
Application	<p>When using clay plasters with wall heating, the plaster should be applied in two layers. The first layer is a two-stage process:</p> <p>Step 1: Apply the clay undercoat plaster to the same thickness as the loops of heating piping without entirely covering them and skim flat.</p> <p>Step 2: After a drying period, apply a further layer of clay undercoat plaster to cover the heating piping. A reinforcement mesh should be applied as part of this layer to avoid cracking as a result of thermal expansion and contraction. Ensure sufficient overlap of adjoining mesh.</p> <p>The undercoat plaster should be allowed to dry thoroughly before applying the second layer of clay finish coat plaster or deco clay facing plaster.</p>
Special notes	<p>The first layer of undercoat plaster can also be applied with the wall heating switched on at normal operating temperature. This reduces the drying time and speeds up the plastering process.</p>

## Deco Clay Facing Plaster

19.301 –19.310

Uses	conluto deco clay facing plaster is a thin-layer pre-coloured facing plaster for decorative interior finishes. All colours can be blended with each other.
Supply	25 kg sacks
Colours	Pure white   white   cream   sahara   cinnamon   ochre   orange   red   anthracite   green
Properties	conluto deco clay facing plaster is a dry ready-mix preparation suitable for machine-processing and conforms to the German regulations DVL LR 3.9. It is vapour-permeable, regulates humidity naturally and binds odours. A slightly 'cloudy' appearance is characteristic for this kind of traditional plaster.
Composition	Naturally coloured earths and clays, mixed-grade coloured sands and quartz, grain-size < 1 mm.
Storage	conluto deco clay facing plaster can be stored indefinitely if kept dry.
Substrate	The substrate should be stable, clean, free of oily films and sufficiently roughened to provide an adequate mechanical key. It is important that the substrate exhibits an even absorbency. Surfaces with varying absorbency, plasterboard and gypsum fibre boards as well as all surfaces unsuitable for plastering directly should be properly primed before plastering. Plasterboard joints must be reinforced with scrim or similar according to the manufacturer's recommendations.
Coverage	A 25 kg sack of conluto deco clay facing plaster produces enough wet plaster to cover approx. 8 m <sup>2</sup> at a thickness of 2 mm. If applied thicker than 2 mm cracking can result.
Preparation	Mix together carefully with 25 vol. % clean water by hand or using a motorised mixing paddle. If a fibrous effect is desired, mix one pack of straw fibre with one sack of deco clay facing plaster (straw fibre must be ordered additionally). The final mixture is ready for use immediately, however we recommend that the mixture be allowed to stand for a short while before application. Larger quantities can be processed with normal mixers or plastering machines.
Application	The wet plaster should be applied evenly with a stainless steel trowel at a thickness of up to 2 mm. For best results always use clean or new tools. The surface should be skimmed flat and rubbed with a float once it has dried to a leather-like hardness, usually after a few hours, depending upon the absorption of the base surface. Once fully dry, the surface should be wetted with water using a spray bottle. Loose particles can then be removed with a rough sponge float. This helps bring out the lustre of the plaster and reduces surface-sanding.
Working and drying times	Clay plasters set mechanically, they do not chemically harden. Once mixed wet plaster can be used for several days if kept under cover. Slight colour alterations may result. The surface can be wetted repeatedly to prolong its workability.
Notes	Coloured clay facing plasters consist of natural materials and can exhibit colour variations. Large uninterrupted and contiguous surfaces should be plastered using material from the same sack, for large surfaces several sacks should be mixed together prior to preparing wet plaster. The final colour appears after drying and any finishing work. Note that the perceived appearance of colours can vary, sometimes considerably, depending upon light and shadow and the finishing techniques used. Soluble ingredients of poorly primed backgrounds may shine through. All instructions and technical details reflect our experience of the product and are provided as information only – they are not legally binding.

<b>Light Clay Bricks</b>	NF 1200 (suitable for nogging for external infill panels)	<b>07.011</b>							
Properties / composition	Light clay bricks NF 1200 are made of crushed clay-rich earth, wood chips and chopped straw. They conform to the German regulations DVL LR 3.9. Density = approx. 1200 kg/m <sup>3</sup> .								
Supply form	Shrink-wrapped on pallets								
Storage	Store dry. Can be stored outdoors if covered with a strong tarpaulin. Light clay bricks can be stored indefinitely. Up to 3 pallets can be stacked on one another.								
Yield	Brick format	Wall thickness							
	NF( 24,0 x 11,5 x 7,1cm)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">11.5 cm</td> <td style="width: 25%; text-align: center;">17.5 cm</td> <td style="width: 25%; text-align: center;">24.5 cm</td> <td style="width: 25%; text-align: center;">on edge</td> </tr> <tr> <td style="text-align: center;">50</td> <td style="text-align: center;">-</td> <td style="text-align: center;">99</td> <td style="text-align: center;">38</td> </tr> </table>	11.5 cm	17.5 cm	24.5 cm	on edge	50	-	99
11.5 cm	17.5 cm	24.5 cm	on edge						
50	-	99	38						
Application	The manufacturing process produces light clay bricks with an inner structure that is suitable for use outdoors. Light clay bricks can be used in the same way as any other bricks. Note that light clay bricks can sometimes be 3-4% larger than the format specified. Pre-wetting the bedding surfaces of the bricks improves the strength of the masonry. Clay bricks can be bedded in light clay mortar, lime mortar or pozzolan/trass-lime mortar. When using lime or pozzolan/trass-lime mortars the bricks should be pre-wetted. When plastering with a lime render, the masonry joints should be scratched out squarely to a depth of 5 mm. In general masonry joint width = masonry joint depth.								
Working and drying time	A drying time is generally not required as dry light clay bricks quickly absorb the mixing water. As the mortar joint dries it shrinks and a section of brickwork may sink slightly as a result. In such cases the uppermost joint may require additional subsequent filling. The surface can be plastered with a clay undercoat or finish coat plaster. Pre-wetting the masonry substrate will prolong the working time for the plaster. When rendering with a lime render it is important to pre-wet the masonry surface according to the manufacturer's recommendations. Light clay brickwork can also be left exposed, be painted or whitewashed. Here too pre-wetting is necessary.								
For external infill panels	We recommend that when light clay bricks are used as nogging for external infill panels, the surface should be rendered after at least a year has elapsed, at the very earliest after the first heating season. This allows infill nogging and timber-frame to adjust to seasonal movement and shrinkage. Failure to observe this can result in damage to the render.								

## Light Clay Bricks

2DF 700

07.013

Properties / composition	Light clay 2DF 700 are made of crushed clay-rich earth, wood chips and chopped straw. They conform to the German regulations DVL LR 3.9. Density = approx. 700 kg/m <sup>3</sup> .				
Supply form	Shrink-wrapped on pallets				
Storage	Store dry. Can be stored outdoors if covered with a strong tarpaulin. Light clay bricks can be stored indefinitely. Up to 3 pallets can be stacked on one another.				
Bricks/m <sup>2</sup>	Brick format	Wall thickness			
		11.5 cm	17.5 cm	24.5 cm	on edge
	2 DF (24,0 x 11,5 x 11,3 cm)	33	-	66	38
Application	The light clay bricks 2 DF 700 are typically used for insulating historic buildings due to their comparatively low density. In most cases this takes the form of a wall lining of brickwork on the inward surface of external walls. Light clay bricks can be used in the same way as any other bricks. Note that light clay bricks can sometimes be 3-4% larger than the format specified. Pre-wetting the bedding surfaces of the bricks improves the strength of the masonry. Clay bricks should be bedded in a light clay mortar.				
Working and drying time	A drying time is generally not required as dry light clay bricks quickly absorb the mixing water. As the mortar joint dries it shrinks and a section of brickwork may sink slightly as a result. In such cases the uppermost joint may require additional subsequent filling. The surface can be plastered with a clay undercoat or finish coat plaster. Pre-wetting the masonry substrate will prolong the working time for the plaster. When rendering with a lime or gypsum render consult the individual manufacturer's recommendations for pre-treating the masonry substrate before applying plaster or render.				

<b>Light Clay Mortar</b>	naturally-moist	<b>05.022</b>																		
Properties / composition	Light clay mortar is a naturally-moist material made of crushed clay-rich earth, sand 0-4 mm and chopped straw 12 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1000 kg/m <sup>3</sup> .																			
Supply / packaging	Naturally-moist in 1 m <sup>3</sup> Big Bags.																			
Storage	Store dry. Can be stored outside for short periods when covered. Store Big Bags on pallets. Naturally-moist light clay mortar should be used within 3 months of delivery.																			
Yield / coverage	1 m <sup>3</sup> naturally-moist light clay mortar provides approx. 0.75 m <sup>3</sup> wet mortar. Depending on the brick format used and wall thickness, the following quantities of mortar are required (in litres):																			
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="border: none;">Brick format</th> <th style="border: none;">nogging 11.5 cm</th> <th style="border: none;">11.5 cm</th> <th style="border: none;">17.5 cm</th> <th style="border: none;">24.0 cm</th> <th style="border: none;">36.0 cm</th> </tr> </thead> <tbody> <tr> <td style="border: none;">NF( 24,0 x 11,5 x 7,1cm)</td> <td style="border: none;">32</td> <td style="border: none;">27</td> <td style="border: none;">-</td> <td style="border: none;">65</td> <td style="border: none;">96</td> </tr> <tr> <td style="border: none;">2 DF (24,0 x 11,5 x 11,3 cm)</td> <td style="border: none;">24</td> <td style="border: none;">20</td> <td style="border: none;">-</td> <td style="border: none;">50</td> <td style="border: none;">75</td> </tr> </tbody> </table>		Brick format	nogging 11.5 cm	11.5 cm	17.5 cm	24.0 cm	36.0 cm	NF( 24,0 x 11,5 x 7,1cm)	32	27	-	65	96	2 DF (24,0 x 11,5 x 11,3 cm)	24	20	-	50	75
Brick format	nogging 11.5 cm	11.5 cm	17.5 cm	24.0 cm	36.0 cm															
NF( 24,0 x 11,5 x 7,1cm)	32	27	-	65	96															
2 DF (24,0 x 11,5 x 11,3 cm)	24	20	-	50	75															
Application	Mortar should be prepared with approx. 25 Vol. % of water using a normal tumbler-mixer, pan-blade or paddle mixer or with mixing pumps. Small quantities can be mixed by hand or with a hand-held motorised paddle mixer. Mortar is used as with any other normal masonry mortar. When plastering with a lime render, the masonry joints should be scratched out squarely to a depth of 5 mm to provide a mechanical key. In general masonry joint width = masonry joint depth.																			
Working and drying time	Once mixed, light clay mortar can be used for several days if kept under cover. Add additional water as necessary. Note that if left for longer periods (several days) in the mixing pump and hoses, the water content can lead to corrosion.																			

<b>Unfired clay bricks</b>	Sun-dried brick (not suitable for external masonry or nogging)	<b>06.010 – 06.026</b>																											
Properties / Composition	Dense unfired clay bricks are made of clay-rich earth. They conform to the German regulations DVL LR 3.9. Density = 1500-2100 kg/m <sup>3</sup> , depending upon the kind of bricks.																												
Supply form	Shrink-wrapped on pallets																												
Storage	Store dry. Can be stored outdoors if covered with a strong waterproof tarpaulin. Protect against rising damp. Unfired clay bricks can be stored indefinitely. Up to 3 pallets can be stacked on one another.																												
Bricks/m <sup>2</sup>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Brick format</th> <th style="width: 15%;">11.5 cm</th> <th style="width: 15%;">17.5 cm</th> <th style="width: 15%;">24.0 cm</th> <th style="width: 15%;">36.5 cm</th> <th style="width: 15%;">on edge</th> </tr> </thead> <tbody> <tr> <td>NF( 24,0 x 11,5 x 7,1cm)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">-</td> <td style="text-align: center;">99</td> <td style="text-align: center;">148</td> <td style="text-align: center;">38</td> </tr> <tr> <td>2 DF (24,0 x 11,5 x 11,3 cm)</td> <td style="text-align: center;">33</td> <td style="text-align: center;">-</td> <td style="text-align: center;">66</td> <td style="text-align: center;">99</td> <td style="text-align: center;">38</td> </tr> <tr> <td>3 DF (24,0 x 17,5 x 11,3 cm)</td> <td style="text-align: center;">-</td> <td style="text-align: center;">33</td> <td style="text-align: center;">45</td> <td style="text-align: center;">(66)</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>					Brick format	11.5 cm	17.5 cm	24.0 cm	36.5 cm	on edge	NF( 24,0 x 11,5 x 7,1cm)	50	-	99	148	38	2 DF (24,0 x 11,5 x 11,3 cm)	33	-	66	99	38	3 DF (24,0 x 17,5 x 11,3 cm)	-	33	45	(66)	-
Brick format	11.5 cm	17.5 cm	24.0 cm	36.5 cm	on edge																								
NF( 24,0 x 11,5 x 7,1cm)	50	-	99	148	38																								
2 DF (24,0 x 11,5 x 11,3 cm)	33	-	66	99	38																								
3 DF (24,0 x 17,5 x 11,3 cm)	-	33	45	(66)	-																								
Application	Unfired clay bricks can be used in the same way as any other bricks. Note that unfired clay bricks can sometimes be 3-4% larger than the format specified. Pre-wetting the bedding surfaces of the bricks improves the strength of the masonry. Clay bricks can be bedded in light clay mortar, lime mortar or pozzolan/trass-lime mortar. When using lime or pozzolan/trass-lime mortars the bricks should be pre-wetted. Dense unfired clay bricks can be used as brick nogging, as stack-bonded brick infill for timber-frame constructions and for pugging and loading floors. Sufficiently dense clay bricks can be used for load-bearing walls, however 'green' unfired bricks (normal bricks but unfired) are not suitable for load-bearing walls.																												
Working & drying time	A drying time is generally not required as unfired clay bricks quickly absorb the mixing water. As the mortar joint dries it shrinks and a section of brickwork may sink slightly as a result. In such cases the uppermost joint may require additional subsequent filling. The surface can be plastered with a clay undercoat or finish coat plaster. Pre-wetting the masonry substrate will prolong the working time for the plaster. When rendering with a lime render it is important to pre-wet the masonry surface according to the manufacturer's recommendations. Light clay brickwork can also be left exposed, be painted or whitewashed. Here too pre-wetting is necessary.																												

<b>Clay mortar, heavy</b>	naturally-moist	<b>05.020</b>																										
Properties / composition	Dense clay mortar is a naturally-moist material made of crushed clay-rich earth and sand 0-4 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1900 kg/m <sup>3</sup> .																											
Supply form	Naturally-moist in 1 m <sup>3</sup> Big Bags.																											
Storage	Store dry. Can be stored outside for short periods when covered. Store Big Bags on pallets. Naturally-moist heavy clay mortar can be stored indefinitely.																											
Yield / coverage	1 m <sup>3</sup> naturally-moist light clay mortar provides approx. 0.75 m <sup>3</sup> wet mortar. Depending on the brick format used and wall thickness, the following quantities of mortar are required (in litres):																											
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Brick format</th> <th style="width: 15%;">11.5 cm</th> <th style="width: 15%;">17.5 cm</th> <th style="width: 15%;">24.0 cm</th> <th style="width: 15%;">36.0 cm</th> </tr> </thead> <tbody> <tr> <td>DF( 24,0 x 11,5 x 5,2cm)</td> <td style="text-align: center;">29</td> <td style="text-align: center;">-</td> <td style="text-align: center;">70</td> <td style="text-align: center;">-</td> </tr> <tr> <td>NF( 24,0 x 11,5 x 7,1cm)</td> <td style="text-align: center;">28</td> <td style="text-align: center;">-</td> <td style="text-align: center;">68</td> <td style="text-align: center;">-</td> </tr> <tr> <td>2 DF( 24,0 x 11,5 x 11,3 cm)</td> <td style="text-align: center;">27</td> <td style="text-align: center;">-</td> <td style="text-align: center;">65</td> <td style="text-align: center;">96</td> </tr> <tr> <td>3 DF( 24,0 x 17,5 x 11,3 cm)</td> <td style="text-align: center;">20</td> <td style="text-align: center;">-</td> <td style="text-align: center;">50</td> <td style="text-align: center;">75</td> </tr> </tbody> </table>			Brick format	11.5 cm	17.5 cm	24.0 cm	36.0 cm	DF( 24,0 x 11,5 x 5,2cm)	29	-	70	-	NF( 24,0 x 11,5 x 7,1cm)	28	-	68	-	2 DF( 24,0 x 11,5 x 11,3 cm)	27	-	65	96	3 DF( 24,0 x 17,5 x 11,3 cm)	20	-	50	75
Brick format	11.5 cm	17.5 cm	24.0 cm	36.0 cm																								
DF( 24,0 x 11,5 x 5,2cm)	29	-	70	-																								
NF( 24,0 x 11,5 x 7,1cm)	28	-	68	-																								
2 DF( 24,0 x 11,5 x 11,3 cm)	27	-	65	96																								
3 DF( 24,0 x 17,5 x 11,3 cm)	20	-	50	75																								
Application	Mortar should be prepared with approx. 25 Vol. % of water using a normal tumbler-mixer, pan-blade or paddle mixer or with mixing pumps. Small quantities can be mixed by hand or with a hand-held motorised paddle mixer. Mortar is used as with any other normal masonry mortar. When plastering with a lime render, the masonry joints should be scratched out squarely to a depth of 5 mm to provide a mechanical key. In general masonry joint width = masonry joint depth. If plastered with a clay plaster, the joints need not be scratched out.																											
Working & drying time	Once mixed, light clay mortar can be used for several days if kept under cover. Add additional water as necessary. Note that if left for longer periods (several days) in the mixing pump and hoses, the water content can lead to corrosion.																											

<b>Rammed earth mix</b>	For rammed-earth walling	<b>02.005</b>
Properties / composition	Rammed earth mixture is a pre-mixed material made of mixed-grain-size to stony clay-rich earth with a bonding strength of > 80 g/m <sup>2</sup> and mineral additives such as coarse sand, gravel or chippings. Grain size 0-22 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1700-2200 kg/m <sup>3</sup> .	
Supply form	Naturally-moist in 1 m <sup>3</sup> Big Bags, with various coloured additives on request: white, red, ochre, anthracite	
Storage	Store dry. Can be stored outside for short periods when covered. Store Big Bags on pallets. Rammed earth mixture can be stored indefinitely.	
Yield	1m <sup>3</sup> naturally-moist rammed earth mixture is sufficient for approx. 0.65 m <sup>3</sup> rammed earth walling.	
Application	Rammed earth is poured or shovelled in layers of approx. 10-15 cm into a pre-prepared suitably stable formwork (usually steel) and mechanically compacted. Both normal large-scale shuttering systems and sliding shuttering as used for concrete can be used. Hand-held tamping equipment as well as electric or pneumatic compacters can be used. Once compacted, the rammed earth maintains its form and the shuttering can be removed. This enables the mixture to dry and harden. <b>Important:</b> The consistency of the rammed earth mixture should be checked prior to use.	
Working and drying time	The drying time depends on several factors, for example the time of year, the wall thickness, weather and environmental conditions. Depending on prevailing weather and ventilation, a 24 cm thick wall can take between 2-4 months to dry fully. In certain circumstances, it can be advantageous to use forced artificial drying to accelerate the drying process.	

<b>Rammed earth screed mix</b>	coarse 0 – 16 mm fine 0 – 8 mm	<b>02.003 + 02.004</b>
Properties / composition	Rammed earth screed mix for rammed earth flooring is a pre-mixed material made of mixed-grain-size to stony clay-rich earth with an bonding strength of > 80 g/m <sup>3</sup> and mineral additives such as coarse sand, gravel or chippings. The fine mix has a grain size of 0-8 mm, the course mix a grain size of 0-16 mm. It conforms to the German regulations DVL LR 3.9. Density = approx. 1700-2200 kg/m <sup>3</sup> .	
Supply form	Naturally-moist in 1 m <sup>3</sup> Big Bags	
Storage	Store dry. Can be stored outside for short periods when covered. Store Big Bags on pallets. Rammed earth mixture can be stored indefinitely but may need additional wetting.	
Yield	1m <sup>3</sup> naturally-moist rammed earth screed mixture is sufficient for approx. 0.65 m <sup>3</sup> rammed earth flooring.	
Application	The first layer of coarse rammed earth mix is poured onto a clean and firm surface that will not give under pressure. Ramming can be undertaken by hand or using a machine (e.g. vibration compactor). The base layer should be at least 7 cm thick. A second layer of finer screed mix should be applied at a thickness of at least 4 cm. The surface can be smoothed with a trowel or rubbing board. Smoothing under pressure will produce a smooth, silky-matt surface. After the floor has completely dried, the surface can be oiled with a suitable floor oil – expert advice should be sought.	
Working & drying time	The drying time depends on several factors, for example the time of year, the screed depth, weather and environmental conditions. Depending on prevailing weather and ventilation, a 7 cm thick screed can take between 3-5 weeks to dry before further surface treatment can be applied. In certain circumstances, it can be advantageous to use forced artificial drying, however this may lead to shrinkage cracking. Movement joints are advisable for larger surfaces.	

<b>Earth for construction</b>	dry	<b>01.002</b>
	naturally-moist	<b>01.003</b>
Properties / composition	Earth suitable for construction purposes with a binding strength of > 80 g/cm <sup>2</sup> and a density of 1800-1900 kg/m <sup>3</sup> .	
Supply form	Naturally-moist, crushed to 5 mm diameter, supplied in Big Bags.  Dry, ground to 0.5 mm diameter, supplied in Big Bags or in 25 kg sacks.	
Storage	Store covered on pallets, or in sacks on a slatted base. The material can be stored indefinitely.	
Yield	Depending on the planned use, mix with 0.5 to 2.5 parts of aggregates to 1 part earth.	
Uses	Binding agent for earthen building materials such as loose earth fill material, clay plasters, clay mortars, straw clay and light clay. It serves as a basis for one's own earth mixtures.	
Working & drying time	<p>Earth mixtures can be prepared using normal tumbler mixers, pan and paddle mixers, small quantities can be mixed by hand or with a hand-held motorised paddle mixer. Aggregates include mineral materials with a grain size of 0-16 mm, in certain cases up to 32 mm, as well as organic or animal fibres for reinforcement and improved material stability. Add first water, then earth and finally the aggregates to the mixing machine and mix well.</p> <p>Considerable experience is required for mixing one's own earthen building materials. Where possible, we recommend using our pre-mixed products.</p>	

<b>Reed board</b>	2 cm and 5 cm
Properties / composition	Natural reed, compressed and bound with galvanized steel wire to form boards. No chemical adhesives. Wire binding every 14-18 cm on both sides, fixed with galvanized staples every 60 mm.
Supply form	Singly or on pallets.  Dimensions: Length: 2 m, width: 1 m, thickness: 20 mm & 50 mm.
Storage	Protect against damp and moisture. Store dry.
Uses	Reed boards can be used as a base or formwork for plastering, and as an insulation board for internal and external use. Reed board is a suitable substrate for both clay and lime plasters.
Preparation and application	<p>Reed boards can be cut perpendicular to the reed direction with a jigsaw, a hand-held circular saw or chopping blade. Reed boards can be cut parallel to the reeds by clipping the wire with a pair of pliers and removing the loose reeds up until the next binding. As such the panel can be cut lengthways only in increments of 60 mm.</p> <p>Internal insulation of external walls: A moisture regulating layer of conluto clay undercoat plaster (min. 1 cm) should be applied to the wall surface. The reed board is then pressed into the clay plaster mortar to ensure good adhesion and capillary conduction for interstitial moisture. The boards should be fixed with insulation screw-fixings on at least 5 evenly distributed points per m<sup>2</sup> area.</p> <p>Fixing to timber substructures: A substructure of timber studs at 50 cm intervals should be erected and the boards applied so that the abutting joints of the boards meet on a stud. Fix with washer-headed galvanized screws.</p>
Plastering	Reed board should be plastered with two layers of plaster. The base layer of clay plaster should incorporate a reinforcement mesh, either over the entire surface or as bands covering all joints generously.
Technical data	Density approx. 190 – 220 kg/m <sup>3</sup> Thermal conductivity $\lambda = 0.059$ W/mK Water vapour permeability $\mu = 2$

**Thermal conductivity  $\lambda$  of earthen building materials in relation to their bulk density:**

Building material	Density in kg/m <sup>3</sup>	Thermal conductivity W/mk
Compacted earth	2000	1,13
	1800	0.91
	1600	0.73
	1400	0.59
Light clay	1200	0.47
	1000	0.35
	900	0.30
	800	0.25
	700	0.21
	600	0.17
	500	0.14
	400	0.12
	300	0.10

**Water vapour permeability  $\mu$  of earthen building materials in relation to their bulk density:**

Building material	Density in kg/m <sup>3</sup>	Water vapour permeability	
		Organic aggregates	Mineral aggregates
Comp.-earth	1200 - 2200	5/10	5/10
Light clay	400 - 1200	3/5	5/10