

HDG DAEMO HS

Brief description	Easy to mix hydraulic special binder for drilling technology, civil engineering and geothermal applications	
Application	Filling of cavities, boreholes, pipelines, drains etc.	
Composition	Highly sulphate-resistant cement as per DIN 1164, fine grain mineral filling materials	
Technical characteristics	Very economical = low-cost consumption, excellent flow properties, easy to process, highly sulphate-resistant	
Packaging type	In 23 kg paper sacks or loose as silo product	
Technical specifications	Yield (= requirement per m ³)	from 750 to 1050 kg per m ³ cavity (corresponds to 22 to 31 litres per 23 kg sack)
	Mixing liquid	water
	Dosage mixing water	approx. 600 - 1000 litres special binder. Optimum processing with 700 litres / 1000 kg
	Water / solid matter ratio	from 0.6 to 1.0 (good dispersion necessary)
	Density of the pumpable mixture	approx. 1.49 to 1.65 kg/dm ³ (see table below)
	Marsh rate for 1000 ml	approx. 45 seconds with W/F = 0.7
	Pumpability	several hundred metres, depending on pump capacity
	Processing time	approx. 60 to 90 minutes
	Sedimentation after 2 hours	<= 2 % with W/F = 0.7 (in 250 ml glass cylinder)
	Firmness after 28 days, uniaxial	approx. 2 N/mm ² (as per DIN 18136, cylind. test object)
	k(f) value after 28 days, triaxial	<= 5 x 10 ⁻⁹ m/s
	Heat conductivity with surface probe	>= 1 W / mK
	Frost resistance	given
	Other material parameters	Bulk density approx. 0.9 to 1.0 kg / dm ³ Granularity fine grain/powder-fine Contains clay / bentonite When stored in a dry place, can be stored for min. 12 months

Yield and firmness		0,6	0,7	0,8	0,9	1,0
Water / solid matter						
Required water quantity l/23 kg sack approx.		14	16	18	21	23
Yield l/23 kg sack approx.		22	24	27	29	31
Compressive strength (28 d)		3	2	1,8	1,0	0,5
Suspension densities (kg/dm ³)		1,65	1,62	1,56	1,52	1,49

Instructions for use of HDG DAEMO HS

The more intensive the digestion by mixing is, the higher the possible water content. Suitable mixers are all conventional high frequency mixers. Otherwise, the known principles of concrete technology and the relevant standards and directives are to be observed.

For a high quality and above all economical preparation of the ready-mix "HDG DAEMO HS" at the place of installation of the geothermal probe, the following is to be observed:

- **intensive dispersion and shearing of the suspension**
Bentonites and clays are layered silicates which cause a slight settling in the fresh mortar, which ensures the barrier effect and density (= low kff(f) index) of the mixture, enable flowability and pumpability and regulate the viscosity. The very small particles must be dissolved and sheared by very intensive mixing and homogeneously distributed in the mixture. Suitable colloidal mixing machines usually have a connected load of > 7 kW and a throughput of > 2 m³/h.
- **maximum utilisation of the quality of the filling mortar**
The clay and bentonite components in HDG DAEMO HS require very intensive mixing and good shearing to have the full effect. In practice, it has repeatedly been shown that a high speed, highly dispersing preparation allows low dosage (i.e. fewer kg per m³), which in term means very economical use. Selection of the right mixer provides long-term cost benefits.
- **correct dosage of the individual suspension components**
The condition for a high quality filling suspension is that the quantity of water in the mixing container is accurately filled and can be provided according to the dosage- instructions. A water gauge, a dipstick measured in litres or other measuring instruments are required for this. The addition of the relevant amount of HDG DAEMO HS in kg (or number of sacks) is then the second step to obtain a suitable end-product which meets the requirements.
- **no lumps, specks or adhesions in the mixing container**
Mixers, preparation machines and recirculation pumps which produce a heterogeneous mixture are not suitable for producing and processing the fill-ing suspension. After a mixing period of 1 - 2 minutes, the suspension must be free of lumps and specks in the container. Adhesions and coatings on the side or in the corners indicate insufficient mixed material and poor mixing.
- **easy checking of the quantity and quality of the suspension**
After the mixing process is completed, a sample is to be taken from the container and checked by measuring (e.g. flow viscosity, suspension density) as compared with the first (calibration) mixture. As another simple way of checking, 1 or 2 litres of the suspension can be filled into a glass cylinder or narrow beaker. Settling (= sedimentation) of the suspension in the vessel can be compared with the previously measured values after 2, 3 or 4 hours.
- **good mixing and pump capacity for fast filling**
For a hole of 150 mm Ø and a depth of 100 m, a filling quantity of ~ 2.4 m³ = 2400 litres (including an extra ~ 30 % for inaccurate measurement, washing, cleaning and rinsing losses) is required. Generally, the hole should be filled continually without interruptions in max. 2 hours . The mixer, pump, lines and personnel must be suitable for this.
- **fast and easy cleaning of the machine**
After completion of the filling work, it should be possible to clean the mixer, pumps, containers, lines and valves completely and free of residue . Hardened suspension residue which has not been removed may block the PE filling tubes with a Ø of 22 mm or even larger the next time they are used and cause insufficient covering of the probe.

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Subject to change. 12/09

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