

# HT33 has been successfully developed in a number of product applications

## Water to HT33 cement ratio VS relative density for HT33 grout

WATER: HT33	SPECIFIC GRAVITY	kg HT33/m <sup>3</sup> yield
0.50	1.68	1120
0.48	1.70	1150
0.43	1.73	1210
0.42	1.76	1240
0.35	1.80	1330
0.30	1.85	1420

## Strength developed for HT33 grout at laboratory temperature at 1.80 specific gravity

1 DAY	2 DAY	7 DAY	28 DAY	35 DAY
Flexural Strength MPa				
1.9	2.5	4.0	4.4	4.6
Unconfined Compressive Strength MPa				
7.6	11.5	17.9	34	37.7

## Strength development (MPa) for an HT33 based pumpable concrete

SPECIFIC GRAVITY	24 HOURS	4 DAY	11 DAY	28 DAY	56 DAY
2.05	8	11.4	21.8	33.6	41.9
2.14	8	10	20	37.9	51.7

## HT33 based fibre reinforced shotcrete results, based on the French rail test.

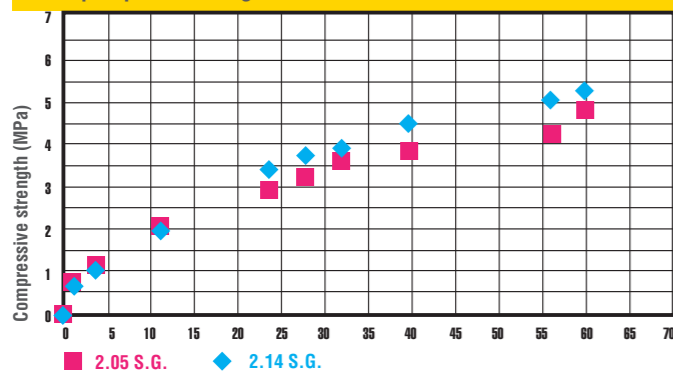
Shotcrete panels of 600 x 600 mm – 10 kilograms/m<sup>3</sup> fibre

TEST TIME	LOAD (KN)	ENERGY ABSORPTION (J)	UCS (MPa)	CORE (MPa)
7 Day	25	405	30.8	35
14 Day	35	625	32.6	
28 Day	94	1 430	57	60

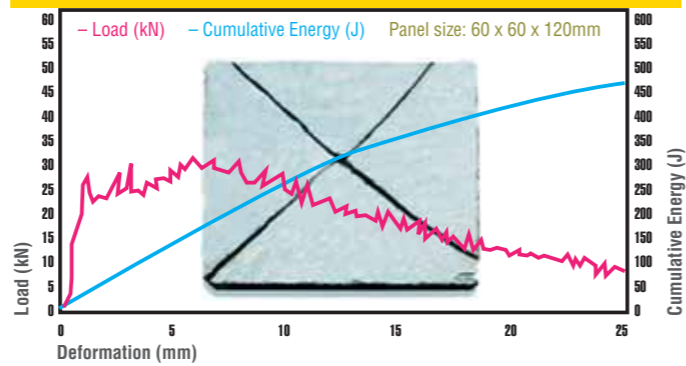
UCS – Unconfined compressive strengths taken on cubes

CORE – Compressive strengths on cores taken from the shotcrete panels

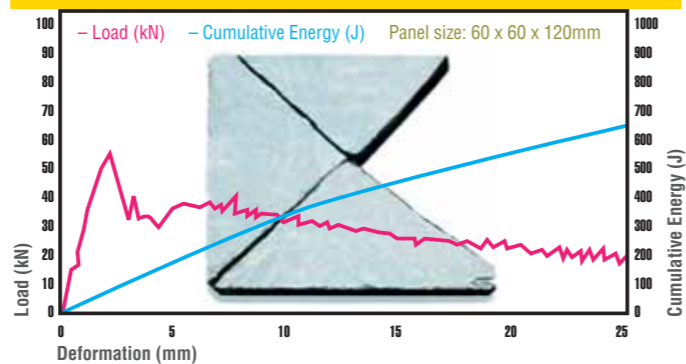
## HT33 pumpcrete strength



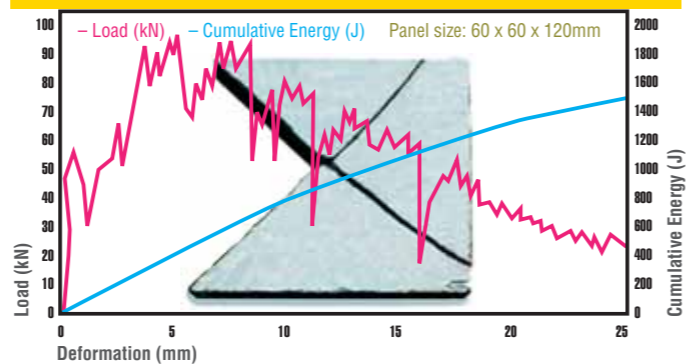
## Polyfibre Wet Shotcrete Slabs. Energy absorption French Rail test. 7 Day



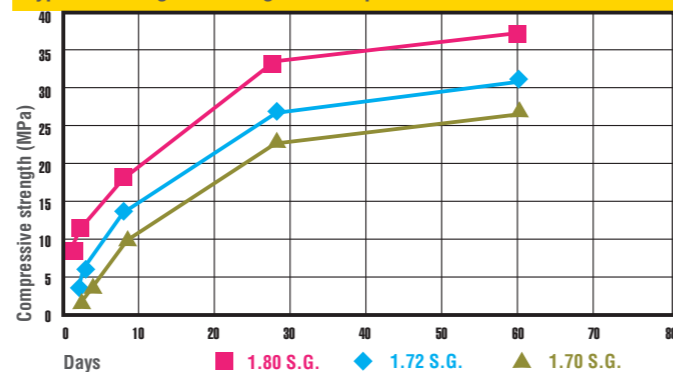
## Polyfibre Wet Shotcrete Slabs. Energy absorption French Rail test. 14 Day



## Polyfibre Wet Shotcrete Slabs. Energy absorption French Rail test. 28 Day



## Typical HT33 grout strength development



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# TECHNICRETE

# HT 33

An underground revolution



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# The HT33 revolution



## Transportability - Hydraulically

HT33 as a grout has excellent lubrication properties, which allows it to be transported through smooth bore pipes at lower than usual pressures.

The minimum recommended internal pipe diameter is 50mm and transport distances of 5 kilometers can be achieved. Long horizontal transport distances have to be engineered using appropriate criteria.

HT33 is a hydraulic hardening construction material consisting of the following:

- Selected Fly Ash • Portland Cement • Special Activators
- Additives

HT33 can be supplied in bulk or in bags and can be transported



Curing requirements for the placed product are the same as those required for Portland Cement products.

HT33 performs even better at elevated temperatures such as the in-situ rock temperatures found in mines with no detrimental effect on the compressive strengths, cracking or shrinkage.

Significant strength improvements are achieved up to 56 days. Thereafter the strength gains are less significant.

## Density of HT33 powder

The loose dry bulk density of HT33 is approximately 1 000 kg per cubic metre. The consolidated dry bulk density of HT33 is approximately 1 300 kg per cubic metre.

The comparative capacity of a silo for Portland Cement to the storage of HT33 powder is 10% less (i.e. a 100 tonne cement silo will store approximately 90 tonnes of HT33).

The relative density of HT33 is 2.58

through pipelines pneumatically or hydraulically.

The product is a grey powder with a maximum particle size of 25mm. Hydraulic hardening grout is produced by mixing HT33 with water. The grout has a workable pot life of 300 minutes.

## Product yield

The grout yield on mixing with water will vary depending on the water to HT33 powder ratio.

A fluid grout mixture with a water to HT33 ratio of 0.45:1 will require approximately 1180 kg of HT33 per cubic metre of "grout" produced. A thick mixture with water to HT33 ratio of 0.35:1 will require approximately 1330 kg of HT33 per cubic metre of "grout" produced.



## Compressive strengths

The unconfined compressive strength of grouts made with HT33 are proportional to the water: HT33 ratio and in-situ temperatures.



## Typical strength performances - Properties of pump-able HT33 "Grout"

### PROPERTIES OF PUMPABLE HT33 "GROUT"

SPECIFIC GRVITY	WATER HT33	ACCELERATOR	FLEXUAL/COMPRESSIVE MPa							
			1 DAY		2 DAY		7 DAY		28 DAY	
			FL.	UCS	FL.	UCS	FL.	UCS	FL.	UCS
1.80	0.35	NIL	1.9	7.6	2.5	11.5	4.0	17.9	4.4	34.0
1.80	0.35	1.00%	1.8	7.0	2.4	10.5	3.7	16.2	4.0	28.3
1.80	0.35	NIL	2.1	6.7	2.2	9.6	4.0	15.0	4.5	30.5
1.80	0.35	3.00%	1.6	5.6	1.9	8.1	2.9	11.5	3.9	24.0



## Accelerators

The HT33 product can be easily accelerated for rapid set. Due to the products reactive nature, caution must be used when dosing to prevent flash setting and loss of final strength.

The use of accelerators should involve prior test-work.

## Permeability

HT33 is regarded as impermeable and is used in numerous water retaining applications overseas.

## Shrinkage

There is virtually no shrinkage at a water: HT33 ratio of 0.35 or less.

## Risk assessment

To be done to customer requirements. HT33 meets all German Mining safety requirements (L.O.M.A).

Handle HT33 with the same ventilation and health precautions as per Portland Cement.

