

# MASTERFLOW<sup>®</sup> 648 CP PLUS

(Formerly sold as Ceilcote<sup>®</sup> 648 CP Plus)

## High Temperature, High Strength, Precision Grout for Heavy Dynamic and Static Loads

### Description of Product

MASTERFLOW<sup>®</sup> 648 CP PLUS Grout is manufactured from the highest quality epoxy resins and carefully graded high strength inert fillers. MASTERFLOW<sup>®</sup> 648 CP PLUS formulation incorporates the best features of the previous range of MASTERFLOW<sup>®</sup> epoxy grouts which have made them world leaders in heavy machinery grouting in harsh environments for over 40 years. (First installation 1956).

High, early and ultimate compressive, flexural and tensile strengths and the ability to withstand even heavy dynamic loads from vibrating or reciprocating equipment plus excellent chemical and temperature resistance have all been important factors in this success.

### Fields of Application

Grouting and bedding of machinery, structures and crane rails providing precise permanent alignment in the harshest industrial environments. For example:

- Gas Transmission Industry:  
very large reciprocating compressors
- Steel Industry:  
crushers, ball mills, rod mills, slab tables
- Plus other industries such as Petrochemical, Mining, Paper and Pulp, have all successfully used 648 series grouts.

### Features and Benefits

- High ultimate compressive, flexural and tensile strengths. Therefore able to withstand heavy static and dynamic loads.
- Rapid curing reduces downtime and allows prompt scheduling of new installation.
- Excellent adhesion to steel and concrete ensuring full transmission of loads.
- Resists many industrial chemicals allowing use in harsh environments.
- Very low shrinkage ensures full contact at load transfer.
- 40 year track record in heavy industrial conditions provides confidence to new specifiers of clients.
- Maintains very high performance even at higher working temperatures with reduced creep and ensures precision alignment is maintained.
- Specifically designed to allow a variable filler ratio to optimise flowability, bearing area and economics.

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Technical Data/Typical Properties

Compressive Strength (BS 6319: Pt 2) at service temperature (cured at 20°C for 7 days N/mm <sup>2</sup> )			
Compressive Strength Development			
Hours	10°C, N/mm <sup>2</sup>	24°C, N/mm <sup>2</sup>	32°C, N/mm <sup>2</sup>
8	-	-	-
16	-	66	69
24	-	76	90
48	31	90	110
72	45	93	110
96	55	96	110
Flexural Strength (BS 6319: Pt 3) cured @ 20°C ± 2°C for 7 days, 20°C N/mm <sup>2</sup>		60	50
Creep (ASTM C1181-91 600 psi 60°C)		4.0 x 10 <sup>-3</sup>	6.0 x 10 <sup>-3</sup>
Tensile Strength (BS 6319: Pt 7) cured at 20°C ± 2°C for 7 days, 20°C N/mm <sup>2</sup>		11.0	10.5
Co-efficient of Thermal Expansion (ASTM C531081) 23°C - 99°C, cm/cm/°C		34.0 x 10 <sup>-6</sup>	41.0 x 10 <sup>-6</sup>
Shrinkage, Unrestrained - Linear (ASTM C531-85), cm/cm		.0005	.00065
Density (ASTM C905-79), Kg/m <sup>3</sup>		2000	1860
Volume per Unit (Ltr), m <sup>3</sup>		0.049	0.041
Bond Strength to Steel - Tension, N/mm <sup>2</sup>		20°C 21	
Bond Strength to Steel - Shear, N/mm <sup>2</sup>		20°C 28	
Colour		Dark Grey	
Flashpoints (Pensky-Martens Closed Cup), °C			
MASTERFLOW <sup>®</sup> 648 CP Plus Grout Liquid		204	
MASTERFLOW <sup>®</sup> 648 CP Plus Hardener		116	

The data is typical and representative properties of actual production runs. Individual test results may vary by approximately 10% due to lab testing variations and batch to batch variations.

Fill ratio

The fill ratio is the weight of the aggregate to combined resin and hardener components. MASTERFLOW<sup>®</sup> 648 CP PLUS is designed to be utilised at a variable fill ratio from the standard 6.75: 1 ratio to as low as 5.06:1 (hi-flow version)

The standard 49 litre unit of MASTERFLOW<sup>®</sup> 648 CP PLUS includes 85.21 kg (4 - 21.3 kg bags) of aggregate. This 6.75:1 fill ratio can be reduced to as low as 3 bags or a 5.06:1 fill ratio yielding 41 litres. For projects requiring a fill ratio different than the standard four bag mix simply determine how many bags of aggregate will be used (number of bags per unit x number of units) and purchase the components (liquid-hardener aggregate) separately.

Unlike most epoxy grouts, MASTERFLOW<sup>®</sup> 648 CP PLUS maintains high bearing area when fill ratios are decreased. In addition, physical properties including high temperature performance are maintained at high levels.

By determining the proper fill ratio for a particular project and purchasing accordingly, the cost per litre, flow and physical properties are optimised. A guideline for suggested fill ratios is shown below. In using this guide the temperature of the foundation and plate is the critical concern, however, grout and ambient temperature are also important.

Fill ratio guideline  
49 Litre unit

Temperature	Very Thin Pours or Very Long Distance	Standard Pours
>32°C	-	-
21°C - 32°C	up to ½ bag	-
10°C - 21°C	½ to 1 bag	½ bag

The chart above provides guidelines showing the amount of aggregate that can be removed from a 49 litre unit in order to optimise both flow and cost per litre

Chemical Resistance of

MASTERFLOW 648 CP Plus  
(tested according to EN 12808-1)

Medium:	Resistance	Remark
<b>INORGANIC ACIDS</b>		
phosphoric acid 85%	+	
nitric acid 20%	(-)	short term spillage can be tolerated
hydrochloric acid (concentrated)	+/-	discoloration
sulphuric acid 70%	+	long term: discoloration
<b>ORGANIC ACIDS</b>		
formic acid 5%	-	
acetic acid 20%	-	
lactic acid 10%	-	
citric acid 10%	+	
<b>LYES</b>		
ammonia solution 25%	+	long term: discoloration
caustic potash solution 50%	+	
caustic soda solution 50%	+	
<b>OTHER SUBSTANCES</b>		
petrols according to EN 228	(-)	short term spillage can be tolerated
machine oil	+	
hydrocarbons	+	
halogenated hydrocarbons	-	
alcohols	(+)	
Esters and ketones	+/-	

**Legend:**

- + = resistant
- (+) = medium-term resistant (>72h, <500h)
- +/- = short-term resistant (<72h)
- = not resistant

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## Application Procedure (Abridged)

Refer to Installation Procedures Bulletin for detailed instructions.

## Concrete preparation and sealing

The concrete surface must be chipped so 25 mm aggregate is exposed to ensure removal of all laitance and weak surface material. New concrete should have a compressive strength of at least 20N/mm<sup>2</sup>, 32N/mm<sup>2</sup> is preferred. The concrete surface must be clean and dry when the grout is poured. The concrete areas to be grouted should not be primed or sealed.

## Material preparation and priming

Base plates or rails and other metal surfaces to be grouted should be cleaned to obtain proper adhesion. This is preferably done just prior to grouting. Primer should be used only when a long delay between cleaning and grouting will allow rusting or contamination. Surfaces where a bond is not desired should be protected with heavy coats of wax.

## Mixing

Add all the contents of the hardener container to the resin components and mix thoroughly for at least 3 minutes. Transfer to a mechanical mixer. Add the aggregate, mixing thoroughly until a uniform consistency is obtained.

## Forming

MASTERFLOW<sup>®</sup> 648 CP PLUS grout is fluid and requires forms. Forms are generally wood, the same as used for forming concrete. They should be of sufficient strength, anchored or braced to withstand pressure from the grout and must be 'liquid tight'.

## Finishing and clean up

A smooth finish may be obtained by spraying or brushing the surface before it hardens with T 435 Solvent approximately 1 hour after the grout is poured. Best results can be obtained by smoothing the surface several times just prior to the hardening of the grout surface. Clean tools and mixer with ketone solvents, xylol or lacquer thinner.

## Pour thickness

MASTERFLOW<sup>®</sup> 648 CP PLUS can be used for deep pours. When pour thickness exceeds 150 mm use of steel rebar is recommended.

With MASTERFLOW<sup>®</sup> 648 CP PLUS' unique variable fill ratio minimum pour thickness can be as low as 12 mm in many applications. When utilising only 3 bags of aggregate, MASTERFLOW<sup>®</sup> 648 CP PLUS achieves flow rates better than many hi-flow epoxy grouts while maintaining excellent bearing area.

## Chemical resistance

MASTERFLOW<sup>®</sup> 648 CP PLUS resists non-oxidising mineral acids and salts, caustics, dilute oxidising acids and salts, and some organic acids and solvents. For more information, refer to Degussa Construction Chemicals UK Technical Services Department.

## Curing

Cure time of the grout will depend upon the temperature of the base and foundation rather than the ambient air temperature. Unless the ambient air temperature has been constant for several days the foundation temperature will generally be lower than air temperature. A surface thermometer and field judgement should be used to determine actual cure rates. Cured grout should have a solid, almost metallic ring when struck close to the base with a hammer.

## Working time

The following chart is a guide for the working time of a MASTERFLOW<sup>®</sup> 648 CP PLUS grout at various ambient temperatures. The working time of MASTERFLOW<sup>®</sup> 648 CP PLUS grout begins when the hardener is added to the liquid.

50 - 60 min	at 32°C
90 - 120 min	at 21°C
120 - 150 min	at 10°C

## Packaging

MASTERFLOW<sup>®</sup> 648 CP PLUS is available in unitised package sizes for your convenience. Due to installation variables etc., it is best to order an additional 10-20% as a safety precaution.

97.91 kg full unit

yield 0.049m<sup>3</sup>

MASTERFLOW<sup>®</sup> 648 CP PLUS

Liquid 9.17 kg -1 pail

Hardener 3.46 kg -1 bottle

Aggregate 21.32 kg - 4 bags

### Storage

Store at ambient temperatures, in dry conditions and keep packages closed. In winter, store in a warm dry place to assure better workability. In summer store in a cool place so cure time will not be reduced.

### Shelf Life

Two years if stored according to manufacturer's instructions in sealed packages.

## MASTERFLOW<sup>®</sup> 648 CP PLUS Degussa Construction Chemicals UK Version 5

### Health and Safety

\*For full information on Health and Safety matters regarding this product the relevant Health and Safety Data Sheet should be consulted.

The following general comments apply to all products.

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs, (which may also be tainted with vapour until the product is fully cured and dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek medical attention. Keep away from children and animals. Reseal containers after use.

### Solvent Based Products

Use in well ventilated areas; avoid inhaling. Suitable respiratory equipment may be needed, eg when spraying. Can cause skin, eye irritation. Wear protective eye shields and gloves during use. Do not smoke or allow sparks or naked lights when stored or in use.

### Powder Products

Should be handled to minimise dust formation; use light mask if excessive dust unavoidable. Cement powders when wet or moistened can cause burns to skin and eyes which should be protected during use.

### Resin Products

Can cause irritation, dermatitis or allergic reaction. Use protective equipment particularly for skin and eyes. Use only in well ventilated areas.

### Spillage

Chemical products can cause damage; clean spillage immediately.

### Disclaimer:

This information and all further technical advice is based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommendation, nor does it imply that similar products could not be used.

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