BUILDING TRUST

PRODUCT DATA SHEET

SikaFlow®-648

(formerly MFlow 648)

High-strength, high-flow, chemical resistant epoxy grout

DESCRIPTION

SikaFlow®-648 is a three-component epoxy resin-based precision grout used to secure critical equipment for proper alignment and transmission of static and dynamic loads. With carefully balanced physical properties and excellent resistance to chemical attack, elevated service temperatures, vibration and torque, SikaFlow®-648 is formulated for easy installation, with good flow characteristics suitable for pouring or pumping in thicknesses from 10 mm up to 150 mm, low dust generation and soap and water clean-up. SikaFlow®-648 is available in all regions of the world, supported by trained sales and technical personnel with experience in the specification and installation of epoxy grouts on every continent.

USES

SikaFlow®-648 is used for assembling and fixing of the following items:

- Industrial turbines, generators and compressors
- Very large reciprocating compressors
- Industrial turbines, generators and compressors.
- Rolling, stamping, grinding, drawing and finishing mills.
- Forging hammers.
- Rail tracks, crane rails.
- Paper machine sole plates.
- Machinery and equipment requiring high strength maximum bearing.

Note: For wind turbine installations please refer to our Sikagrout-9000 series.

FEATURES

- High early and ultimate strengths for rapid turn-around
- Low creep maintains equipment alignment
- Retains physical properties at elevated temperatures increasing the service range
- Low-dusting for added worker comfort and safety
- Very low shrinkage for full baseplate contact and load transfer
- Excellent flowability with high bearing area for even load distribution
- Variable fill ratio for desired flowability
- Excellent adhesion to steel and concrete for optimum load transfer and vibration dampening
- High chemical resistance enables use in challenging environments
- Excellent freeze/thaw resistance for equipment in low temperature service environments
- Resists water and chloride intrusion for use in wet and aggressive environments
- Resists impact and dampens torque to protect equipment and extend service life
- Extended working time
- Pumpable for maximum productivity on large grout installations
- Durable bond to concrete and steel optimizes load transfer
- Meets the requirements of EN 1504-6
- Can be applied in thickness from 10 to 150 mm
- Globally available for consistent project results.

PRODUCT INFORMATION

Packaging

The standard 57.5 litre unit of SikaFlow®-648 includes 100kg (four 25kg bags) of Part C aggregate. This can be reduced to as low as 3 bags yielding 51.5 litres.

Part A	11.35 kg
Part B	3.55 kg
Part C	25 kg bag
Set	114.9 kg (1A+1B+4C)
Yield	57.5 l

Refer to the current price list for available packaging variations.
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Appearance and colour

Dark Grey

Shelf life

24 months if stored at below mentioned storage conditions.

Storage conditions

Store at ambient temperatures, out of direct sunlight, in cool, dry warehouse conditions and clear of the ground on pallets protected from rainfall prior to application. The resin parts need to be protected from frost!

Density

2,000 kg / m³ Filling ratio 1 / 6.7 (1 set resin + 4 bags) 1,750 kg / m³ Filling ratio 1 / 5 (1 set resin + 3 bags)

TECHNICAL INFORMATION

Compressive strength

Mechanical Strenght at: (EN 12190)

Test specimen size: 40 mm x 40 mm x 160mm

Temperature	+10 ° C	+23 ° C	+23 ° C	+30 ° C
Filling ratio (resin/aggregate)	1 / 6.7 (1xA+1xB+4xC)	1 / 6.7 (1xA+1xB+4xC)	1 / 5.0 (1xA+1xB+3xC)	1 / 6.7 (1xA+1xB+4xC)
8 hours	-	40 N/mm²	35 N/mm²	50 N/mm²
16 hours	-	70 N/mm²	60 N/mm²	75 N/mm²
1 day	30 N/mm²	75 N/mm²	65 N/mm²	80 N/mm²
3 days	80 N/mm²	85 N/mm²	68 N/mm²	85 N/mm²
7 days	90 N/mm²	95 N/mm²	70 N/mm²	95 N/mm²

Test specimen size: 50 mm × 50 mm × 50 mm (ASTM C579)

Curing time	Measured value
1 day	72 N/mm²
7 days	97 N/mm²

Modulus of elasticity in compression

≥ 15 000 N/mm² (filling ratio 1/ 6.7) (EN 13412)
≥ 12 000 N/mm² (filling ratio 1/ 5)

Effective bearing area

> 85 % (ASTM C1339)

Flexural-strength

Mechanical Strenght at: (EN 12190)

Test specimen size: 40 mm x 40 mm x 160mm

Temperature	+10 ° C	+23 ° C	+23 ° C	+30 ° C
Filling ratio (resin/aggregate)	1 / 6.7 (1xA+1xB+4xC)	1 / 6.7 (1xA+1xB+4xC)	1 / 5.0 (1xA+1xB+3xC)	1 / 6.7 (1xA+1xB+4xC)
8 hours	-	16 N/mm²	17 N/mm²	20 N/mm²
16 hours	-	22 N/mm²	20 N/mm²	22 N/mm²
1 day	15 N/mm²	25 N/mm²	22 N/mm²	25 N/mm²
3 days	25 N/mm²	27 N/mm²	23 N/mm²	27 N/mm²
7 days	28 N/mm²	30 N/mm²	25 N/mm²	28 N/mm²

Shear strength

Slant shear strength: (7 days) (EN 12188)

50 ° slope	76 N/mm²
60 ° slope	61 N/mm²
70 ° slope	73 N/mm²

Pull-out resistance

≤ 0.6 mm (EN 1881)

Pull-out strength at 75 kN Load

Shrinkage

≤ 0.2 [mm/m] 28 days (EN 12617-4)

Creep

≤ 0.6 mm (EN 1544)

Creep under tensile load for 3 months at 50 kN Load

Tensile adhesion strength

Adhesion to concrete: ≥ 3.0 N/mm² (7 days) (EN 1542)

Adhesion to steel: ≥ 10.0 N/mm² (1 day) (EN 12188)

Coefficient of thermal expansion

3.7×10^{-5} 1/K (EN 1770)

Reaction to fire

class Efl (EN 13501-1)

no ignition (EN ISO 11925-2)

Chemical resistance

Chemical Resistance according to EN 12808-1

Test liquids according to EN 13529

Group	Description	Test liquid	Change in compressive strength after 72 h [%]	Change in compressive strength after 500 h [%]
DF 1	Gasoline	47.5% toluene + 30.4% isooctane + 17.1% n-heptane + 3% methanol + 2% 2-methyl-propanol-(2)	< 5	< -20
DF 3	Fuel oil, Diesel fuel and other unused combustion motor oils	80 % n-paraffin (C12 to C18) + 20 % methylnaphthalene	< -5	< -5
DF 4	All hydrocarbons as well as mixtures containing benzene with max. 5 Vol. %	60% toluene + 30% xylene + 10% methylnaphthalene	< 1	< 3
DF 5	Mono- and polyvalent alcohols (up to a max. 48 vol.-% methanol), glycol ethers	48 Vol.-% methanol + 48 Vol.-% IPA + 4% water	< -10	< -15

Group	Description	Test liquid	Change in compressive strength after 72 h [%]	Change in compressive strength after 500 h [%]
DF 7	All organic esters and ketones	50 % ethyl acetate + 50 % methyl isobutyl ketone	< -5	< -5
DF 10	Mineral nonoxidizing) up to 20% and inorganic salts in aqueous solution (pH<6) except HF	Sulphuric acid (20%)	< -5	< -30
DF 11	Inorganic lye (except oxidizing) and inorganic salts in aqueous solution (pH>8)	Sodium hydroxide solution (20%)	< -5	< -10
DF 12	Aqueous solutions of inorganic non-oxidizing salts with a pH value between 6 and 8	Aqueous sodium chloride solution (20%)	< -5	< -5
-	Concentrated acids	Phosphoric acid (85%)	< -15	< -5
-	Concentrated acids	Hydrochloric acid conc. (37%)	< -10	< -30

Note: Severe chemical attack may lead to discolouration of SikaFlow®-648. This is however no sign of physical weakening of the product.

Freeze thaw de-icing salt resistance	Adhesion to concrete after freeze-thaw: ≥ 2.0 N/mm² (28 days) (50 cycles with salt)	(EN 13687-1)
Temperature resistance	+80 °C Glass transition temperature	(EN 12614)
Watertightness	Water tightness under pressure: passed, no leakage	(internal method)

APPLICATION INFORMATION

Mixing ratio	Component A : B : C = 3.2 : 1 : (21–28) by weight Liquid / Solids = 1 : (5–6.7) by weight
Yield	Set 114.9kg (1A+1B+4C) = 57.5 l
Layer thickness	Minimum grout depth: 10 mm Maximum grout depth: 150 mm
Peak exotherm	43 °C (internal method)
Ambient air temperature	+10 °C min. / +30 °C max.

Dew point	Substrate temperature during application must be at least 3 °C above dew point to avoid condensation.
Substrate temperature	+10 °C min. / +30 °C max.
Open Time	The following chart is a guide for the working time of a SikaFlow®-648 grout at various ambient temperatures. +10 °C: 120 - 150 minutes +21 °C: 90 - 120 minutes +30 °: 50 - 60 minutes The open time begins when the resin and hardener are mixed. It is shorter at high temperatures and longer at low temperatures. The larger the quantity mixed, the shorter the pot life. To obtain longer workability at high temperatures, the mixed grout may be divided into portions. Another method is to chill components A+B and C before mixing them (i.e. only when application temperatures are above +20 °C).
Curing time	Full cure is reached in 7 days after the application at a constant temperature of 23 ºC.
Flowability	Full plate contact: < 20 minutes (ASTM C1339) to back of box: < 30 minutes

BASIS OF PRODUCT DATA

All technical data stated in this Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

FURTHER DOCUMENTATION

HANDLING AND TRANSPORT Usual preventive measures for the handling of chemical products should be observed when using this product, for example do not eat, smoke or drink while working and wash hands when taking a break or when the job is completed. Specific safety information referring the handling and transport of this product can be found in the Material Safety Data Sheet. For full information on Health and Safety matters regarding this product the relevant Health and Safety Data Sheet should be consulted. Disposal of product and its container should be carried out according to the local legislation in force. Responsibility for this lies with the final owner of the product.

ECOLOGY, HEALTH AND SAFETY

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it. For safe use follow the instructions given in the product data sheet. Based on our current knowledge, this product does not contain SVHC (substances of very high concern) as listed in Annex XIV of the REACH regulation or on the candidate list published by the European Chemicals Agency in concentrations above 0,1 % (w/w).

APPLICATION INSTRUCTIONS

NOTES ON INSTALLATION

- Do not apply at temperatures below +10 ºC nor above +30 ºC.
- Do not add solvent, water, or any other material to the grout.
- Do not alter the resin or hardener proportions.
- Cold material will exhibit decreased flowability and reduced strength development.
- Chamfering the concrete edge helps reduce thermal cracking. Following proper installation procedures also reduces the potential for cracking.
- Severe chemical attack may lead to discolouration of SikaFlow®-648. This is however no sign of physical weakening of the product.
- In case of thicker applications and complex geometries consult your local Sika representative.

SUBSTRATE PREPARATION

The concrete should be free of frost, curing membranes, waterproofing treatments, oil stains, laitance, friable material and dust. The concrete surfaces should be chipped and if there is a water leakage it must be drained or properly plugged. Surfaces should be dry. Particular attention should be paid to bolt holes to ensure that these are dry. Use vacuum and/or oil free compressed air to remove free standing water. The concrete areas to be grouted should not be primed or sealed. Base plates, bolts, etc. must be clean (SA 2½) and free of oil, grease and paint etc. to obtain proper adhesion. Set and align equipment. If shims are to be removed after the grout has set, then lightly grease them for easy removal. Priming the metal surfaces is only required when a long delay between cleaning and grouting will allow corrosion and contamination. A head box should be installed with the formwork to ease the pour and flow of the mixed grout:

Ensure formwork is secure and watertight to prevent movement and leaking during the placing and curing of the grout. The area should be free of excessive vibration. Shut down adjacent machinery until the grout has hardened. In hot weather, base plates and foundations must be shaded from direct sunlight. Bags and buckets of grout should be stored in the shade prior to use. In cold weather, the temperature of base plates and foundations should be raised to over +10°C

MIXING

The fill ratio is the weight of the aggregate to combined resin and hardener components. SikaFlow®-648 is designed to be utilised at a variable fill ratio (resin / aggregate) from the standard 1 / 6.7 ratio to as low as 1 / 5 (hi-flow version).
The standard 57.5 litre unit of SikaFlow®-648 includes 100kg (four 25kg bags) of Part C aggregate. This can be reduced to as low as 3 bags yielding 51.5 litres.
Resin and filler components can be purchased separately. Unlike most epoxy grouts, SikaFlow®-648 maintains high bearing area when fill ratios are decreased. In addition, physical properties including high temperature performance are maintained. 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 in the following table. In using this guide, the temperature of the foundation and plate is the critical concern, however, grout and ambient temperature are also important. Add all the contents of the hardener container to the resin part and mix thoroughly for at least 3 minutes. Transfer to a mechanical mixer. Add the aggregate, mixing thoroughly until a uniform consistency is obtained. At low temperatures (+10°C) the flow characteristics of SikaFlow®-648 will be reduced and installation times increased.

APPLICATION

Lengths of metal strapping laid in the formwork prior to placing may be necessary to assist grout flow over large areas and in compacting and eliminating air pockets. Have sufficient manpower, materials and tools to make mixing and placing rapid and continuous. Where grout must flow some distance, make the initial batch slightly more fluid or flowable than required; this lubricates the surfaces and avoids blockage of the grout that follows. The grout shall be poured continuously and from one side only, to avoid entrapment of air while grouting. Maintain a constant hydrostatic head, preferably of at least 15 cm. On the side where the grout has been poured, allow 10 cm clearance between the side of the form and the base plate of the machine. On the opposite side allow 5-10 cm clearance between the formwork and the base plate. Due to differences in temperature between the grout under the base plate, and exposed shoulders that are subject to more rapid temperature changes, debonding and / or cracking can occur. Avoid shoulders wherever possible. If shoulders are required, they should be firmly anchored with reinforcing to the substrate to prevent debonding.
Make sure grout fills the entire space to be grouted and remains in contact with the plate throughout the entire grouting placement. Note: Do not use vibrator for placing the grout!

CLEANING OF EQUIPMENT

After the pour is complete, remove uncured epoxy from the mixer, wheelbarrow and tools with soap and water or a citrus degreaser. Cured material can only be removed mechanically.

LOCAL RESTRICTIONS

Note that as a result of specific local regulations the declared data and recommended uses for this product may vary from country to country. Consult the local Product Data Sheet for exact product data and uses.

LEGAL NOTES

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product’s suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.