BUILDING TRUST
CONSTRUIRE LA CONFIANCE

PRODUCT DATA SHEET

SikaFlow®-648

(formerly MFlow 648)

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

PRODUCT 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.

WHERE TO USE

SikaFlow®-648 is used in various industries such as chemical processing, oil & gas extraction, refining, processing and distribution, power generation, LNG production, storage and transmission, pulp & paper production, steel & aluminum manufacturing, mining and other heavy industry.
SikaFlow®-648 is used for the following applications:

- Precision alignment of turbines, compressors, generators, pumps, fans and electric motors
- Pour-back grouting for post-tensioning cables
- Sole plates
- Crane rail grouting
- Grouting of rolling, stamping, grinding, crushing, drawing and finishing mills, forging hammers and other equipment subject to high torque, impact and vibration
- Grouting of anchors, bars and dowels
- Grouting of wind turbine tower bases

CHARACTERISTICS / ADVANTAGES

- Meets API Standard 686
- High early and ultimate strengths for rapid turnaround
- Low creep maintains equipment alignment
- Retains physical properties at elevated temperatures
- Low-dusting for added worker comfort and safety
- Very low shrinkage for full baseplate contact
- 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
- 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
- Globally available for consistent project results.

PRODUCT INFORMATION

Packaging

0.01 m³ (0.4 ft³) [24.6 kg (54.4 lb) unit]*

Part A	Resin	2.5 kg (5.5 lb) pail
Part B	Hardener	0.75 kg (1.65 lb) bottle
Part C	Aggregate	21.3 kg (47 lb) bag

*All components are packaged in a 6-gallon pail.

0.05 m³ (1.7 ft³) [98.2 kg (216.6 lb) unit]**

Part A	Resin	10.0 kg (22.0 lb) pail
Part B	Hardener	3.0 kg (6.6 lb) bottle
Part C	Aggregate	4 x 21.3 kg (47 lb) bag

**All components packaged separately. May be ordered as a 3-bag unit, which will yield 1.4 ft³ (0.04 m³). When estimating project requirements, be sure to account for application variables

Appearance / Colour

Dark Grey

Shelf Life

24 months if stored at below mentioned storage conditions.

Storage Conditions

Store at ambient temperatures (16 °C to 27 °C [60 °F to 80 °F]), out of direct sunlight, in cool, dry conditions and clear of the ground on pallets protected from rainfall prior to application. The resin components need to be protected from frost.

Density

4-bag mix (6.55:1)	2084 kg/m³ (130 lb/ft³)	(ASTM C905)
3-bag mix (4.92:1)	1971 kg/m³ (123 lb/ft³)	

TECHNICAL INFORMATION

Compressive Strength

Consistency (Fill Ratio)	7 Day Ambient	Post-cured	ASTM C579, Method B
4-bag mix (6.55:1)	100 MPa (14 500 psi)	110 MPa (16 000 psi)	
3-bag mix (4.92:1)	96 MPa (14 000 psi)	103 MPa (15 000 psi)	

Time	10 °C (50 °F)	25 °C (77 °F)	32 °C (90 °F)	ASTM C579, Method B
24 hours	32 MPa (4700 psi)	75 MPa (10 800 psi)	88 MPa (12 700 psi)	
2 days	69 MPa (10 000 psi)	83 MPa (12 100 psi)	91MPa (13 200 psi)	
3 days	76 MPa (11 000 psi)	90 MPa (13 000 psi)	94 MPa (13 600 psi)	
4 days	83 MPa (12 000 psi)	92 MPa (13 400 psi)	96 MPa (13 900 psi)	

*Filled 6.55:1, cured 24 hours at room temperature, post-cured 16 hours at 10 °C (140 °F), and conditioned 24 hours at test temperature.

Effective Bearing Area

25 mm (1 in) clearance	High (>85 %)*	(ASTM C1339)
50 mm (2 in) clearance	High (>85 %)*	

*4-bag mix (6.55:1)

Modulus of Elasticity in Flexure

Consistency (Fill Ratio)	@ 23 °C (73 °F)	ASTM C580
4-bag mix (6.55:1)	17.2 GPa (2.5 x 106 psi)	
3-bag mix (4.92:1)	15.9 GPa (2.3 x 106 psi)	

Tensile Strength	4-bag mix (6.55:1)	13.8 MPa (2000 psi)	ASTM C307
	3-bag mix (4.92:1)	12.4 MPa (1800 psi)	
Shear Strength	Bond strength to steel	14 MPa (2000 psi) at 23 °C (73 °F)	Michigan DOT
Shrinkage	**Consistency (Fill Ratio)**		(ASTM C531)
	4-bag mix (6.55:1)	0.014	
	3-bag mix (4.92:1)	0.031	
	Unrestrained; linear, %		

Creep	**Consistency (Fill Ratio)**	**2.8 MPa (400 psi) load**	**4.1 MPa (600 psi) load**	(ASTM C1181, 60 °C, 28 days)
	4-bag mix (6.55:1)	3.8×10^{-3}	4.2×10^{-3}	
	3-bag mix (4.92:1)	4.0×10^{-3}	4.3×10^{-3}	

Coefficient of Thermal Expansion	**Consistency (Fill Ratio)**	**23 °C - 99 °C (73 °F - 210 °F)**	(ASTM C531)
	4-bag mix (6.55:1)	32.2×10^{-6} cm/cm/°C (18×10^{-6} in/in/°F)	
	3-bag mix (4.92:1)	36×10^{-6} cm/cm/°C (20×10^{-6} in/in/°F)	

Flow Rate	**Clearance**	**Back of Box**	**Full Plate Contact**	ASTM C580
	25 mm (1 in)	11 min*	13 min*	
	50 mm (2 in)	4 min, 45 sec*	5 min*	
	*4-bag mix (6.55:1)			

APPLICATION INFORMATION

Yield	24.6 kg (54.4 lb) unit yields 0.01 m^3 (0.4 ft^3) 98.2 kg (216.6 lb) unit (4-bags) yields 0.05 m^3 (1.7 ft^3) 76.9 kg (169.6 lb) unit (3-bags) yield 0.04 m^3 (1.4 ft^3).
Layer Thickness	Minimum grout depth: 13 mm (1/2 in) Maximum grout depth: 150 mm (6 in)
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.

Pot Life	**Temperature**	**Time**
	10 °C (50 °F)	120–150 minutes
	21 °C (70 °F)	90–120 minutes
	32 °C (90 °F)	50–60 minutes

BASIS OF PRODUCT DATA

Product properties are typically averages, obtained under laboratory conditions. Reasonable variations can be expected on-site due to local factors, including environment, preparation, application, curing and test methods.

LIMITATIONS

The user is responsible for the proper use of the product. Site visits by Sika personnel are for the sole purpose of providing technical recommendations and are in no way intended to supervise or control the quality of work on site.

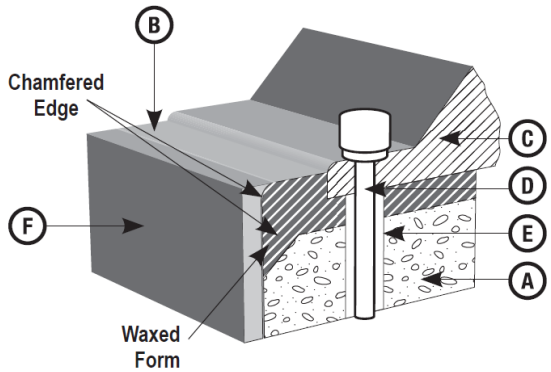
- Do not thin or alter SikaFlow®-648. The addition of products such as thinners, solvents, water, aggregates, etc. will void any applicable Sika warranty.
- Do not alter the resin or hardener proportions. Always mix full units.
- Always use a head box when placing less than 25 mm (1 in) depths.
- Cold 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 however, may or may not affect the physical properties of the product.
- In case of thicker applications and complex geometries consult your local Sika Canada Technical Representative.

ENVIRONMENT, HEALTH & SAFETY

User must read the most recent corresponding Safety Data Sheets (SDS) before using any products. The SDS provides information and advice on the safe handling, storage and disposal of chemical products and contains physical, ecological, toxicological and other safety-related data.

APPLICATION INSTRUCTIONS

Figure 1 - Regular Equipment



Key:

A. Concrete Foundation	D. Anchor Bolt
B. Grout	E. Anchor Bolt Sleeve Seal
C. Equipment Base	F. Form

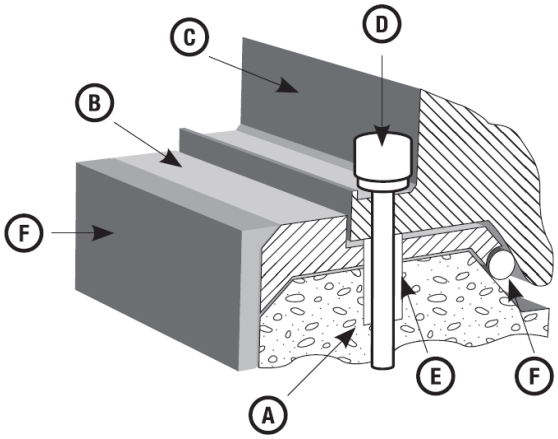


Figure 2 - Engine with Oil Pan

Figure 3 - Rail or Soleplate

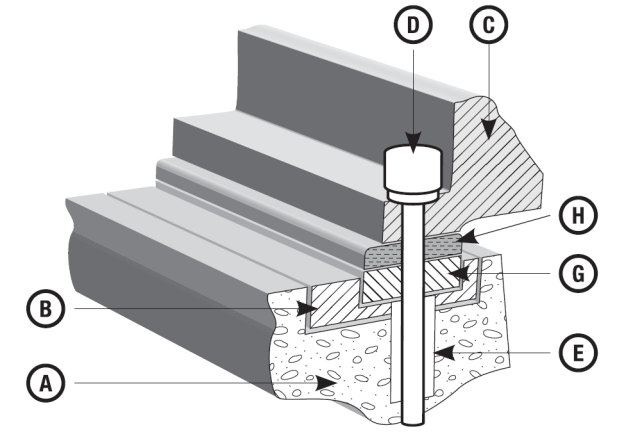


Figure 4 - Typical Rail with Expansion Joint Section

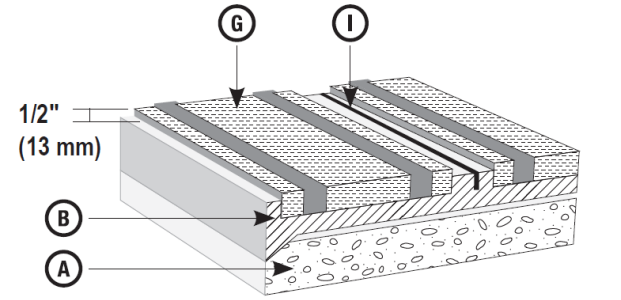
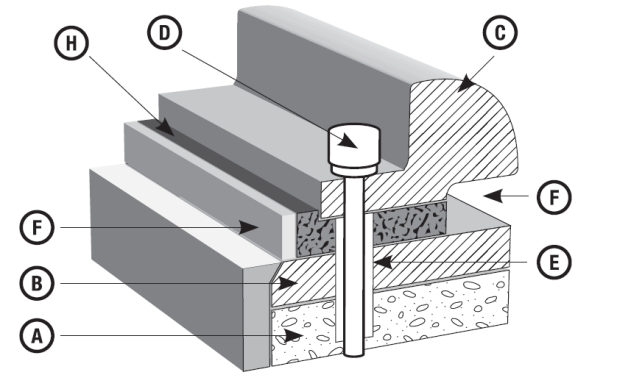


Figure 5 - Typical Epoxy Chock Application



SUBSTRATE QUALITY

The foundation must be cured and dry, and the design strength of the concrete achieved before grouting.

SUBSTRATE PREPARATION

Concrete

The surface to be grouted must be clean, strong, and roughened to a CSP of 5–9, following ICRI Technical Guideline No. 310.2 to permit proper bond. Do not use a bushing hammer. Chamfer the edge of the concrete 45 degrees to about 50 mm (2 in) width. If an anchor bolt sleeve is to be filled, be sure all water is removed. Use a siphon, vacuum pump, or rubber hose and bulb. Remove the residual moisture by either forced air or evaporation. Seal the anchor bolt hole with felt, foam rubber, or other means. Cover all shims and leveling screws with putty or clay to keep the grout from adhering. Use model clay, glazing putty, or anything with a putty consistency that will stick but not harden. Shims or jack pockets may be formed with wood, and forms filled with damp sand. Remove shims or jack screws after the grout cures. Shade the foundation from direct sunlight for at least 24 hours before and 48 hours after grouting.

Steel

If rust scale is present, abrade the bonding surfaces of the base to be grouted; it must be free of coatings, wax, grease, or scale. Mechanical methods, such as grinding or sanding, will suffice, but do not produce as high a bond strength as sandblasting. Primer should be used **only** when a long delay between cleaning and grouting could allow excessive rusting or contamination. Protect the area above it with masking tape or coverings. The grout should come up at least 19 mm (¾ in) onto the equipment. Protect the area above it with masking tape. To facilitate cleanup, wax or cover all surfaces where the grout may splash or spill.

MIXING

Aggregate must be completely dry. Precondition all components to 21 °C (70 °F) for 24 hours before using. Pour the hardener (Part B) into a pail of grout resin (Part A) and stir by hand with a spatula or paint stir paddle until well mixed to a uniform amber colour. Pour the mixture into a horizontal shaft mortar mixer or a Kol type mixer without delay. Add the grout aggregate, one bag at a time, and mix only until aggregate is completely wetted out to avoid air entrapment. The first batch may be slightly less fluid than later batches because some of the resin is retained on the walls of the mixer. Withholding ½ –1 bag of aggregate from the first batch of a full unit will compensate for lost resin.

Note: Always add aggregate to the mixer after the premixed liquids have been poured in.

Temperature	1.7 ft³ unit very thin pours or very long distance	Standard pours
> 32 °C (> 90 °F)		
21 °C to 32 °C (70 °F to 90 °F)	Up to ½ bag	
10 °C to 21 °C (50 °F to 70 °F)	½ to 1 bag	½ bag

APPLICATION

Use the recommended procedure according to ACI 351.1R, Grouting Between Foundations and Bases for Support of Equipment and Machinery.

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 100 mm (4 in). On the side where the grout has been poured, allow a 100 mm (4 in) clearance between the side of the form and the base plate of the machine. On the opposite side allow 50 to 100 mm (2 to 4 in) 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 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!

COLD-WEATHER CURING

For cold weather grouting use SikaFlow 640 Accelerator. Refer to the SikaFlow 640 Accelerator PDS.
The foundation and the equipment base will probably be cooler than room temperature unless room temperature has been constant for some time. Use the foundation and engine temperature, therefore, in estimating cure time. Temperatures may vary so radically, day Vs. night, atmospheric Vs. metal surface, that field judgment must still be used as the final measure. Cured grout should have a solid, almost metallic feel when struck with a hammer. Be sure to check as close to the base of the equipment as possible.

HOT-WEATHER GROUTING

Special care must be exercised when grouting at elevated temperatures, to reduce risks of premature hardening and subsequent cracking.

If the temperature of the packaged grout exceeds 32 °C (90 °F), chill the sealed pails of grout resin in a tub of ice or cover the pails with water-soaked burlap to cool the grout to 21 °C (70 °F). Provide shade from direct sunlight for at least 24 hours before and 48 hours after grouting.

COLD-WEATHER GROUTING

Temperatures below 16 °C (60 °F) make the grout stiff and hard to handle and significantly increase the cure time. The baseplate and foundation may be much cooler than room temperature. In cold weather, store materials in a warm place. For best handling, the temperature of the grout components and mixing equipment should be at least 21 °C (70 °F). When baseplate and foundation temperatures (measured by a contact thermometer) are below 10 °C (50 °F), heating the area may be necessary. If heating is required, erect an enclosure around the equipment and foundation to be grouted. Forced air or infrared heaters may be used to obtain the necessary heat to increase the baseplate and foundation temperatures to 10 to 21 °C (50 to 70 °F). Avoid local hot spots. Apply heat 1–2 days in advance of grouting to achieve uniform baseplate and foundation temperatures. Avoid exposure to exhaust from heating equipment. Remove heat during grout placement. For temperatures ranging from 4 °C to 10 °C (40 °F to 50 °F), consider using SikaFlow 640 Grout Accelerator to accelerate strength development.

CLEAN UP

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 recommendations, or from any other advice offered. The information contained herein does not relieve the user of the products from testing them for the intended

application and purpose. 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 or may be downloaded from our website at: www.sika.ca

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