

CEILCOTE® 648 CP PLUS

High strength, high temperature, high flow epoxy grout

DESCRIPTION:

CEILCOTE® 648 CP PLUS represents the continued evolution and improvement of the CEILCOTE series since the original introduction of CEILCOTE 648 in 1956. Through the advancement of polymer and aggregate technology, CEILCOTE 648 CP PLUS combines the high temperature performance and crack resistance of CEILCOTE 648 CP with the excellent flow characteristics of CEILCOTE 648-1 and CEILCOTE 650.

RECOMMENDED FOR:

- Precision alignment of machinery, compressors and prime movers in the gas transmission and other industries
- Foundations under crusher ball mills, slab tables and other equipment in the steel industry
- The pulp and paper, chemical processing, mining and power industries for a wide variety of applications
- Applications requiring fast turnaround with high early and seven day compressive strengths

FEATURES/BENEFITS:

- High early and seven day strengths
- Superior physical properties at high temperatures
- Excellent bearing area and flow
- Variable fill ratio for the optimum mix of flowability, bearing area and economics on a project by project basis
- Good chemical resistance

PACKAGING/ESTIMATING:

CEILCOTE 648 CP PLUS is available in two unitized package sizes for convenience. Due to installation variables etc., it is best to order an additional 10 to 20% as a safety precaution.

216 lb Full Unit (1.73 ft³, 0.05 m³)

- Grout Liquid one 20.2 lb pail (10.06 kg)
- Hardener one 7.6 lb bottle (3.4 kg)
- Grout Aggregate four 47 lb bags (21.3 kg)

54.4 lb Unit (0.43 ft³, .012 m³)

- Grout Liquid one 5.1 lb pail (2.3 kg)
 - Hardener one 1.9 lb bottle (.9 kg)
 - Grout Aggregate one 47 lb bag (21.3 kg)
- (54 lb unit is shipped in a 5 gallon pail over-pack)

PERFORMANCE DATA¹:

Fill Ratio

The fill ratio is the weight of aggregate to combined resin and hardener components. CEILCOTE 648 CP PLUS is designed to be utilized at a variable fill ratio from the **standard 6.75:1** ratio to as low as 5.06:1 (**hi-flow version**).

The standard 1.73 ft³ unit of CEILCOTE 648 CP PLUS includes 188 lb/85.2 kg (four 47 lb bags) of aggregate. This 6.75:1 fill ratio can be reduced to as low as three bags or a 5.06:1 fill ratio yielding 1.44 ft³. 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, CEILCOTE 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 ft³, flow and physical properties are optimized. 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:

Temperature	1.73 ft ³ Unit	
	Very Thin Pours or Very Long Distances	Standard Pours
>90 °F (>32 °C)	-	-
70 °F-90 °F (21 °C-32 °C)	up to 1/2 bag	-
50 °F-70 °F (10 °C-21 °C)	1/2 to 1 bag	1/2 bag

The chart above provides guidelines showing the amount of aggregate that can be removed from a 1.73 ft³ unit in order to optimize both flow and cost per ft³. A maximum of 12 lb of aggregate can be removed from a 0.43 ft³ unit.

Chemical Resistance

CEILCOTE 648 CP PLUS resists non-oxidizing mineral acids and salts, caustics, dilute oxidizing acids and salts, plus some organic acids and solvents. For more specific information, contact your Master Builders Representative.

Cure Time vs. Temperature

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 base/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 CEILCOTE 648 CP PLUS grout at various ambient temperatures. The working time of CEILCOTE 648 CP PLUS grout begins when the hardener is added to the liquid.

50 to 60 minutes @ 90 °F (32 °C)
90 to 120 minutes @ 70 °F (21 °C)
120 to 150 minutes @ 50 °F (10 °C)

Compressive Strength

(ASTM C579-96 Method B, Modified 1-1/2" Cubes)

Fill Ratio	7 Day Ambient		Post Cured*	
	psi	(MPa)	psi	(MPa)
(standard)	14,000	(96)	15,000	(110)
(hi-flow)	11,500	(79)	12,500	(86)

Elevated Temperature - Compressive Strength*

(ASTM C-580)

	73 °F (23 °C)		140 °F (60 °C)		170 °F (77 °C)	
	psi	(MPa)	psi	(MPa)	psi	(MPa)
(standard)	15,000	(110)	12,300	(85)	10,000	(69)
(hi-flow)	12,500	(86)	9,000	(62)	7,000	(48)

Elevated Temperature - Flexural Modulus*

	73 °F (23 °C)		140 °F (60 °C)		170 °F (77 °C)	
	psi x10 ⁶	(GPa)	psi x10 ⁶	(GPa)	psi x10 ⁶	(GPa)
(standard)	2.1	(15.0)	1.7	(11.6)	0.8	(6.0)
(hi-flow)	1.6	(11.0)	1.3	(8.9)	0.5	(3.0)

Elevated Temperature - Flexural Strength*

	73 °F (23 °C)		140 °F (60 °C)		170 °F (77 °C)	
	psi	(MPa)	psi	(MPa)	psi	(MPa)
(standard)	4,500	(31)	4,000	(28)	3,500	(24)
(hi-flow)	4,000	(28)	3,500	(24)	3,000	(21)

Creep

(ASTM C 1181-91, 600 psi 140 °F)

(standard)	4.0 x 10 ⁻³ in/in (cm/cm)
(hi-flow)	6.0 x 10 ⁻³ in/in (cm/cm)

*Cured 24 hours at room temperature, post cured 16 hours at 140 °F, and conditioned 24 hours at test temperature.

Cure Rates

Hours	50 °F (10 °C)		75 °F (24 °C)		90 °F (32 °C)	
	psi	(MPa)	psi	(MPa)	psi	(MPa)
8	—	—	—	—	—	—
16	—	—	9,500	(66)	10,000	(69)
24	—	—	1,000	(76)	13,000	(90)
48	4,500	(31)	13,000	(90)	14,000	(110)
72	6,500	(45)	13,500	(93)	15,000	(110)
96	8,000	(55)	14,000	(96)	15,000	(110)

Tensile Strength

(ASTM C 307-83)
 (standard) 2,200 psi
 (hi-flow) 2,000 psi

Coefficient of Thermal Expansion

(ASTM C531-81) 73 to 210 °F (23 ° to 99 °C)
 (standard) 19.0 x 10⁻⁶ in/in/°F
 34.0 x 10⁻⁶ cm/cm/°C
 (hi-flow) 23.0 x 10⁻⁶ in/in/°F
 41.0 x 10⁻⁶ cm/cm/°C

Shrinkage, Unrestrained - Linear

(ASTM C531-85)
 (standard) .0005 in/in (cm/cm)
 (hi-flow) .00065 in/in (cm/cm)

Bond Strength to Steel - Tension 73 °F (23 °C)
 3000 psi (21 MPa)

Bond Strength to Steel - Shear 73 °F (23 °C)
 4000 psi (28 MPa)

Density

(ASTM C905-79)
 (standard) 124 lb/ft³ (1986 kg/m³)
 (hi-flow) 117 lb/ft³ (1874 kg/m³)

Volume Per Unit

(standard) 1.73 ft³ (.049 m³)
 (hi-flow) 1.44 ft³ (.041 m³)

Impact Strength Better Than Concrete

Abrasion Resistance Better Than Concrete

Color Dark Grey

Flash Points

(Pensky-Martens Closed Cup)
 CEILCOTE 648 CP PLUS Grout Liquid 400 °F (204 °C)
 CEILCOTE 648 CP PLUS Hardener 240 °F (116 °C)

¹The above 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.

APPLICATION:

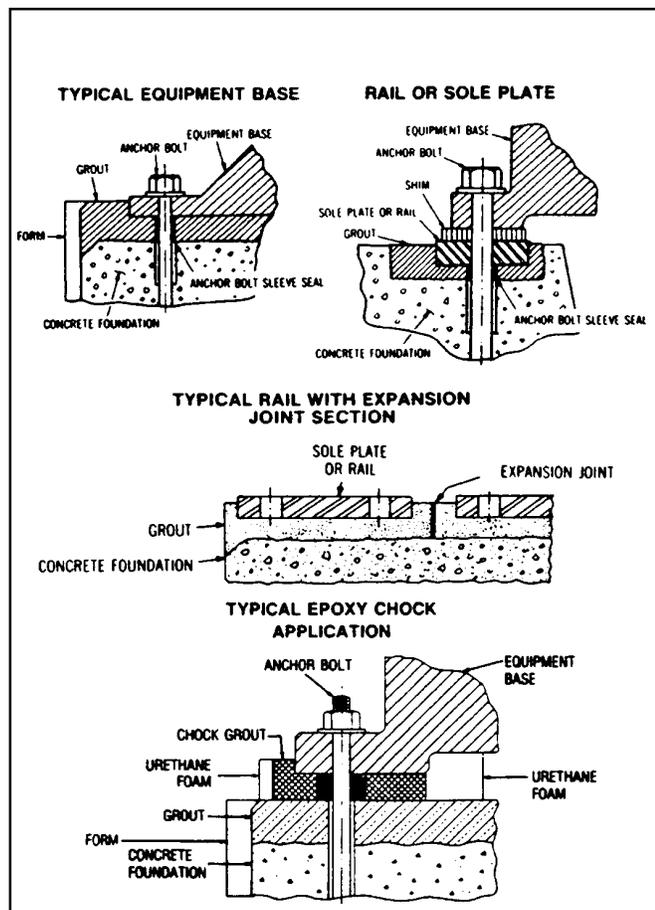
Consult the CEILCOTE 648 CP PLUS Installation Bulletin or the product bag for details on the installation of CEILCOTE 648 CP PLUS grout.

CEILCOTE 648 CP PLUS can be used for deep pours. When pour thickness exceeds 6 inches, use of steel rebar is recommended. See Installation Bulletin on expansion joint and reinforcement bar suggestions.

With CEILCOTE 648 CP PLUS' unique variable fill ratio minimum pour thickness can be as low as 1/2" in many applications. When utilizing only three bags of aggregate, CEILCOTE 648 CP PLUS achieves flow rates better than many hi-flow epoxy grouts while maintaining excellent bearing area.

Master Builders recommends that the user request the services of the local representative for a pre-job conference to plan the installation.

EXAMPLES OF PROPER EPOXY FOUNDATION GROUT INSTALLATION:



LIMITATIONS:

CEILCOTE 648 CP PLUS Grout is a three component epoxy grout formulated for industrial and professional use only and must be kept out of the reach of children. These products contain chemicals which may be potentially HARMFUL to your health if not stored and used properly. Hazards can be significantly reduced by observing all precautions which are found on material safety data sheets and product labels. Please read this literature carefully before using product.

RELATED BULLETINS:

CEILCOTE 648 CP PLUS - Material Safety Data Sheet
 CEILCOTE 648 CP PLUS - Installation Bulletin 9I17
 CEILCOTE 648 CP PLUS - Specification Bulletin 9S17

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