DUBLIN
CALIFORNIA

FACT SHEET

LOW CARBON CONCRETE

MUNICIPAL CODE

WHAT IS THE PURPOSE OF THE LOW CARBON CONCRETE BUILDING CODE?

The purpose of the new building code is to reduce embodied greenhouse gas emissions associated with concrete, a key building material, while still ensuring adequate strength and durability for the intended application.

WHAT IS LOW CARBON CONCRETE?

Low carbon concrete consists of industrial cement combined with mineral compounds, including crushed limestone or secondary cementitious materials such as calcined clays, fly ash, blast-furnace slag or glass pozzolan. Depending on the mix, the carbon footprint of concrete can be reduced by up to 70%.

IS LOW CARBON CONCRETE MORE EXPENSIVE THAN ORDINARY PORTLAND CEMENT CONCRETE?

No, low carbon concrete is cost-competitive and in some cases can be less expensive to produce.

WHICH PROJECTS REQUIRE LOW CARBON CONCRETE?

Projects that require a building permit and use ready-mix concrete are subject to the low-carbon concrete building code. Ready-mix concrete is typically delivered from a central plant via a concrete mixer truck. Projects that use pre-packed bagged cement mixed on the job site, such as Quikrete, are not subject to low carbon concrete requirements. Asphalt, stucco, shotcrete, and gunite are exempt from the requirements. Projects that do not require a building permit do not need to use low carbon concrete but are encouraged to do so if feasible.

WHAT ARE THE LOW CARBON CONCRETE LIMITS?

The following table identifies the allowable limits of cement and embodied carbon in a concrete mix. Allowable limits for high early strength mixes are increased by 30%.

Cement and Embodied Carbon Limit Pathways

	Cement Limits	Embodied Carbon Limits
Minimum specified compressive strength f'c, psi	Maximum ordinary Portland cement content, lbs/yd3	Maximum embodied carbon kg CO2e/m3, per EPD
Up to 2500	362	260
2501-3000	410	289
3001-4000	456	313
4001-5000	503	338
5001-6000	531	356
6001-7000	594	394
Greater than 7000	657	433
Up to 3000 light weight	512	578
Up to 4000 light weight	571	626
4001-5000 light weight	629	675

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QUESTIONS?

For more information, visit the City's website or contact the Environmental & Sustainability Division.

925-833-6630

100 Civic Plaza,
Dublin, CA 94568

Scan this QR code to visit our website:

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WHERE CAN I FIND LOW CARBON CONCRETE?

There are multiple low carbon concrete suppliers in Northern California. A list of available local suppliers that have Environmental Product Declarations (EPDs) available for their mixes can be viewed at https://www.buildingtransparency.org/ Some sources of low carbon concrete mixes near Dublin include:

- Cemex facility in Oakland and Pleasanton
- Central Concrete facility in Oakland and Pleasanton
- Star Concrete facility in San Jose
- Granite Rock Materials facility (San Jose Concrete) in San Jose

HOW DO I PROVE THAT I MEET LOW CARBON CONCRETE STANDARDS?

A low carbon concrete compliance form must be submitted with the permit application. The compliance form and example calculations are available on the City's Environmental and Sustainability Division website. The applicant must also provide an Environmental Product Declaration (EPD) which can be obtained from the concrete supplier (see example EPD on the following pages). The EPD will indicate the embodied carbon in the concrete mix and will provide evidence that the proposed mix is within allowable limits.

WHAT IF I DON'T HAVE AN EPD AT THE TIME OF PERMIT APPLICATION?

If you cannot secure a concrete supplier at the time of permit application, the compliance form can be submitted with the maximum allowable limits based on the concrete mixes anticipated to be used in the project. A revised form will need to be submitted with EPDs before and after concrete is poured. Concrete cannot be poured until the building inspector reviews and approves a compliance form with EPDs.

WHAT IF I CANNOT MEET THE REQUIREMENTS?

The ordinance includes an exemption for hardship or infeasibility. The burden is on the applicant to show hardship or infeasibility and is subject to review and approval by the City's Building Official. Circumstances that constitute hardship or infeasibility may include but are not limited to commercial availability, cost impacts from achieving compliance, or impairments to historic structures. In instances where the Building Official issues a hardship or infeasibility exemption, the Building Official reserves the right to require the maximum feasible threshold of compliance reasonably achievable for the project.

WHAT IF I DO NOT MEET THE REQUIREMENTS?

If an applicant does not meet the low carbon concrete requirements, the application may show equivalnet carbon reductions from other aspects of the project, subject to approval from the Building Official. If an exemption or reduced threshold has not been granted by the Building Official, the Building & Safety Division reserves the right to issue penalty fees commensurate with the excess carbon content and staff administrative time.

Concrete Mix Design Submittal

Date Issued : 12/15/2022
Submittal No.: BA-057253
Project ID: 3084332-41323306
Version: 1 Plant: F31

Customer: Skyline Steel Inc.
Project: 6700 Dublin Blvd.

Usage: Low Carbon Mix

Mix Number : **1627035** **4PG 564 F 15%S 25% WR**

Cement content

Material Type	Description	Standard	Design Quantity	Volume (ft3)
Cement	Type II/V Cement	C150	338 lb	1.72
Fly Ash	Class F Fly Ash	C618	85 lb	0.57
Slag	Slag Cement Grade 120	C989	141 lb	0.78
Coarse Aggregate	3/8" x #8 DOT	C33	1750 lb	10.46
Fine Aggregate	Con Sand	C33	1319 lb	7.98
Admixture	Water Reducer / Type A&D	C494	- -	-
Water	Water	C1602	36.0 gal	4.81
Water Reducer / Type A&D: 3.0 To 6.0 lq oz Per 100 lb of Cement		Air Content		0.67
		Yield	3934 lb	27

27 cubic feet = 1 cubic yard

Design strength

Design Strength (f'c) at 28:	3000	psi	Design Unit Weight:	145.7	lb/ft3
Target Slump:	4.00	+/- 1.00	Design W/C+P Ratio:	0.53	
Air Content:	2.5 %		Design Volume:	27	ft3

CEMEX has no knowledge or authority regarding where this concrete mix is to be placed or its intended application. It is the sole responsibility of the Customer to ensure that the mix parameters of compressive strength, water cement ratio, cement content, pumpability, and air content, are appropriate for the environment conditions at the project site.
The customer acknowledges and confirms that this information is confidential and is being disclosed to the recipient for the purpose of review only. By accepting this information, the recipient agrees:
-to maintain this information in confidence at all times,
-to not disclose this information, in whole or in part, by way of summary or analysis, to anyone except as explicitly agreed to by CEMEX.
COMMENTS:
* Admixture dosages may vary and may be adjusted for ambient temperature, jobsite conditions, and placement time requirements.
* All design parameters are specifically for point of discharge only. CEMEX cannot guarantee any slump, air, or other properties at the point of placement after concrete has been pumped or conveyed to the point of placement.

* The air listed in the mix design above is entrapped naturally. No air entrainment or air entrainment admixture is present in the mix
* Strength history for this mix design is not available at this time. The strength indicated above is for reference only and is not to be interpreted as a binding agreement with Cemex in accordance with any project specifications..

CEMEX

ENVIRONMENTAL PRODUCT DECLARATION

Mix 1627035 • Pleasanton Plant

This Environmental Product Declaration (EPD) reports the impacts for 1 cubic meter of ready mixed concrete mix, for use in meeting the following specifications:

- ASTM C94: Ready-Mixed Concrete
- UNSPSC Code 30111505: Ready Mix Concrete
- CSA A23.1/A23.2: Concrete Materials and Methods of Concrete Construction
- CSI Division 03-30-00: Cast-in-Place Concrete

COMPANY

CEMEX
10100 Katy Freeway, Suite 300
Houston, TX 77043

PLANT

Pleasanton Plant
1544 Stanley Boulevard
Pleasanton, CA 94566

EPD PROGRAM OPERATOR

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428

DATE OF ISSUE

12/16/2022 **(valid for 5 years until 12/16/2027)**

ENVIRONMENTAL IMPACTS

Declared Product:
Mix 1627035 • Pleasanton Plant
Description: 4PG 564 F 15% S 25% WR
Compressive strength: 4000 PSI at 28 days

Correct unit for LCC Compliance Form

Declared Unit: 1 m^3 of concrete (1 cyd)

Embodied carbon content, provided in two sets of units, check for correct unit

Global Warming Potential (kg CO_2-eq)	**236 (180)**
Ozone Depletion Potential (kg CFC-11-eq)	**4.22E-6 (3.23E-6)**
Acidification Potential (kg SO_2-eq)	**0.82 (0.63)**
Eutrophication Potential (kg N-eq)	**0.19 (0.15)**
Photochemical Ozone Creation Potential (kg O_3-eq)	**20.5 (15.7)**
Abiotic Depletion, non-fossil (kg Sb-eq)	**9.14E-6 (6.99E-6)**
Abiotic Depletion, fossil (MJ)	**1,643 (1,256)**
Total Waste Disposed (kg)	**0.86 (0.65)**
Consumption of Freshwater (m^3)	**3.53 (2.70)**

Product Components: natural aggregate (ASTM C33), Portland cement (ASTM C150), slag cement (ASTM C989), fly ash (ASTM C618), batch water (ASTM C1602), admixture (ASTM C494)

Additional detail and impacts are reported on page three of this EPD

ISO 21930:2017 Sustainability in Building Construction — Environmental Declaration of Building Products: serves as the core PCR
PCR for Concrete, NSF International, August 2021 v2.1 serves as the sub-category PCR

Sub-category PCR review was conducted by Thomas P. Gloria • Industrial Ecology Consultants

Independent verification of the declaration, according to ISO 14025:2006: ☐ internal ☑ external

Third party verifier Thomas P. Gloria (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants

climate earth
EPDs made easy

For additional explanatory material
Manufacture Representative: Heman Jose Perez Rodriguez (hernanjose.perez@cemex.com)
Software Tool: CarbonCLARITY Suite, EPD Generator • Verification
LCA & EPD Developer: Climate Earth (support@climateearth.com)