Backfill Sand

Summary

This engineering material specification (EMS) defines the minimum requirements for imported sand used in bedding and embedment backfill around gas pipe in trenches.

This EMS is used for specifying this material in the contract procurement process, applicant design and installation, local maintenance and construction, and general construction.

Target Audience

Personnel involved in sourcing, engineering, construction, and supplier quality inspection.

Requirements

1 General

1.1 Backfill sand (sand) can be well or poorly graded material as determined in ASTM D2487-11, “Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).”

1.2 Sand must be free of organic and harmful materials that could cause adverse environmental impact.

1.3 Do not use blasting abrasives containing toxic elements that are at or above hazardous waste levels defined in Code of Federal Regulations (CFR) Title 40, Protection of Environment, Part 261—Identification and Listing of Hazardous Waste or California Code of Regulations.

1.4 Sand must conform to the physical properties listed in this EMS.

1.5 The responsible engineer may specify additional requirements for specific project needs.

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2 Grain Size Distribution Requirements

2.1 Sand must meet the soil gradation requirements listed in Table 1, “Grain Size Distribution Requirements,” using ASTM C136-14, “Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.”

Table 1. Grain Size Distribution Requirements

Sieve	Sieve Size		% Passing
3/8"	0.375 in.	9.5 mm	100
No. 4	0.187 in.	4.75 mm	90–100
No. 200	0.00298 in.	75 µm	0–15

3 pH Value

3.1 Value of pH must be between 4.5 and 9, using ASTM G51-95, “Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing,” or ASTM D4972-13, “Standard Test Method for pH of Soils.”

4 Resistivity

4.1 Resistivity must be greater than 3000 ohm-cm, using ASTM G57-06(2012), “Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method,” or ASTM G187-12a, “Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method.”

1. IF Resistivity is less than 3000 ohms-cm,

   THEN the following chemical content limits apply:

   a. Total chloride content: equal to or less than 500 parts per million, as determined by EPA Method 300.0 prepared by Parr O2 bomb combustion.

   b. Total sulfate content: equal to or less than 150 parts per million, as determined by EPA Method 300.0 prepared by Parr O2 bomb combustion.

5 Maximum Dry Unit Weight and Optimum Moisture Content

5.1 Supplier must provide the maximum dry unit weight and optimum moisture content of sand determined by using the standard or modified Proctor test (ASTM D698-12 or ASTM D1557-12) or equivalent.

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6 Testing

6.1 Pacific Gas and Electric Company (PG&E) reserves the right to:

1. Request supplier to provide written documentation summarizing the test results and certify that the supplied sand meets the specifications in this EMS. The documentation must include the length of time for which the test results are valid (typically 12 months).

2. Request supplier to provide new test results when there is a change in the original approved source.

3. Obtain samples from the source for internal testing at any time.

7 Records

7.1 Retain records per the records retention schedule.

END of Requirements

Definitions

Soil Gradation: Classification of a coarse-grained soil that ranks the soil based on the different particle sizes.

pH: Measurement of the acidity or alkalinity of a solution or material.

Resistivity: Measurement of how strongly a material opposes electrical current.

Compliance Requirement/ Regulatory Commitment

Code of Federal Regulations (CFR) Title 49, Transportation, Part 192—Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.319, “Installation of pipe in a ditch.”

California Public Utilities Code, Article 3, Equipment, Practices, and Facilities, Section 787

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Reference Documents

Developmental References:

American Association of State Highway and Transportation Officials (AASHTO) M 145, “Soil Classification System”.

A.W. Peabody, *Control of Pipeline Corrosion,* Second Edition (National Association of Corrosion, 2001)

California Department of Transportation (Caltrans) Corrosion Guidelines

Caltrans 2015 Standard Specifications

United States Bureau of Reclamation (USBR) Earth Manual Part 1, Third Edition, 1998

Supplemental References:

ASTM C136-14, “Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates”

ASTM D698-12, “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort”

ASTM D1557-12, “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort”

ASTM D2487-11, “Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)”

ASTM D4972-13, “Standard Test Method for pH of Soils”

ASTM G51-95, “Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing”

ASTM G57-06(2012), “Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method”

ASTM G187-12a, “Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method”

Appendices

NA

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Attachments NA

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Revision Notes

Where?	What Changed?
Revision 1a	
Section 7	Added section, including records retention statement.
Revision 1	
Entire Document	Updated entire document to current EMS template.
Section 2	Updated gradation requirements.
Section 3	Removed organic impurities requirement.
Section 3	Removed sand equivalency requirement.
Section 3	Removed “Coefficient of Uniformity” requirement.
Section 4	Updated resistivity requirements.
Section 5	Updated maximum dry unit weight and optimum moisture content.
Section 6	Updated testing requirements.

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