**Silica sand**

**Silica** is the name given to a group of minerals composed of silicon and oxygen, the two most abundant elements in the earth's crust. Silica is found commonly in the crystalline state and rarely in an amorphous state. It is composed of one atom of silicon and two atoms of oxygen resulting in the chemical formula SiO2.

Sand consists of small grains or particles of mineral and rock fragments. Although these grains may be of any mineral composition, the dominant component of sand is the mineral quartz, which is composed of silica (silicon dioxide). Other components may include aluminum, feldspar and iron-bearing minerals. Sand with particularly high silica levels that is used for purposes other than construction is referred to as silica sand or **industrial sand**.

**Silica sand in Egypt**

There are two main locations in Egypt having high quality of silica sand, the first location lies at Zaafranaarea – Red Sea and the second one locates at north and south Sinai. The reserves at the mentioned areas are over thousands million ton of high quality silica sand, which used in the glass industries, paints, foundries, chemicals and ceramics.

**Our products:**

1. **FILTER SAND.**
2. **FRAC SAND.**
3. **GLASS SAND.**
4. **SPORT SAND.**
5. **FOUNDRY SAND**
6. **FILTER SAND.**

* **APPLICATIONS**

1. Filtration media for a domestic and commercial pool filter.
2. Wet sandblasting.
3. Epoxy flooring.
4. Water treatment plants.
5. Render scratch coats.
6. Bulking out self-leveling compounds.
7. Decorative applications.

* **SPECIFICATIONS**

|  |  |  |
| --- | --- | --- |
| PRODUCT | Effective Size (mm) | Nominal Size (mm) |
| ESFL1 | 0.45 - 0.55 | 0.5 - 1.0 |
| ESFL2 | 0.56 - 0.70 | 0.6 - 1.2 |
| ESFL3 | 0.85 - 0.95 | 0.8 - 1.8 |
| ESFL4 | 1.5 - 1.7 | * 1. - 3.0 |

1. **FRAC SAND.**

* **APPLICATIONS**

Hydraulic fracturing process that generating fractures in the rock, where some subsurface rock units such as organic shale contain large amounts of oil, natural gas or natural gas liquids that will not flow freely to a well. They will not flow to a well because the rock unit either lacks permeability (interconnected pore spaces) or the pore spaces in the rock are so small that these fluids cannot flow through them. Frac sand is known as a "proppant" because it props the fractures open.

* **SPECIFICATIONS**
* **SIZE**

|  |  |  |  |
| --- | --- | --- | --- |
| PRODUCT | Grain size (Mesh) | Grain size (mm) | National name |
| ESFR1 | 6 - 16 | 2.38 – 1.68 | 8/12 |
| ESFR2 | 8 – 30 | 2.00 – 0.84 | 10/20 |
| ESFR3 | 16 - 50 | 0.84 – 0.42 | 20/40 |
| ESFR4 | 40 - 200 | 210 – 105µ | 70/140 |

|  |  |  |
| --- | --- | --- |
| size | | fines % |
| mesh | mm |
| 6-12 | 3.36 -1.68 | 16- 18% |
| 20-40 | 0.84 – 0.42 | 10- 12% |
| 30-50 | 0.595 – 0.297 | 6- 8% |
| 40 -70 | 0.42 – 0.21 | 4- 6% |

* **PHYSICAL PROPERTIES :**
* **Crush resistance** (compressive stresses of 4,000 to 6,000 psi)
* **Solubility** : insoluble
* **Sphericity& roundness** Spherical shape 0.6 or larger.
* **Purity:** high-purity quartz sand (AT LEAST 99% SiO2).

1. **GLASS SAND.**

* **APPLICATIONS**

1. Optical & ophthalmic.
2. Tableware & lead crystal glass.
3. Borosilicate glass.
4. Colorless container.
5. Clear flat glass.
6. Colored container glass.
7. Optical fiber.

* **SPECIFICATIONS**
* **CHEMICAL ANALYSIS**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PRODUCT | grade | SiO2% | Fe2O3% | Al2O3% | K2o% | Cr2O3% |
| ESG1 | A | 99.60 (+/- 0.1) | 0.013 – 0.015 | 0.2 (+/-0.1) | 0.01 (+/-0.01) | 0.00015 |
| ESG2 | B | 99.50 (+/- 0.1) | 0.016 – 0.020 | 0.2 (+/-0.1) | 0.01 (+/-0.01) | 0.00012 |
| ESG3 | C | 99.30 (+/- 0.1) | 0.018 – 0.022 | 0.4 (+/-0.2) | 0.01 (+/-0.02) | 0.00012 |
| ESG4 | D | 99.00 (+/- 0.2) | 0.022 – 0.025 | 0.4 (+/-0.2) | 0.01 (+/-0.02) | 0.00020 |
| ESG5 | E | 98.50 (+/- 0.2) | 0.025 – 0.030 | 1.0 (+/-0.5) | 0.01 (+/-0.02) | 0.00020 |
| ESG6 | F | 98.00 (+/- 0.2) | 0.030 - 0.035 | 1.0 (+/-0.5) | 0.02 (+/-0.02) | 0.00020 |
| ESG7 | G | 97.00 (+/- 0.3) | 0.035 – 0.050 | 2.0 (+/-0.5) | 0.02 (+/-0.02) | 0.00030 |
| ESG8 | G1 | 96.00 (+/- 0.3) | 0.050 - 0.075 | 3.0 (+/-0.5) | 0.03 (+/-0.02) | 0.00030 |
| ESG9 | G2 | 95.00 (+/- 0.3) | 0.075 – 0.100 | 3.0 (+/-0.5) | 0.03 (+/-0.02) | 0.00040 |
| ESG10 | G3 | 94.00 (+/- 0.5) | 0.100 – 0.300 | 4.0 (+/-0.5) | 0.04 (+/-0.02) | 0.00040 |

1. **SPORT SAND.**

* **Applications**

1. Artificial pitches.
2. Root zones turf.
3. Manage drainage for play grounds.
4. Mix Sands.

* **SPECIFICATIONS**
* **Size**

|  |  |  |
| --- | --- | --- |
| item | size | % |
| Gravel ≥ 2mm | 0.3 – 0.5 | 2.5 – 3.0 |
| Very coarse (2.0 – 1.0 mm) | 5.0 – 15 | 6.0 - 10 |
| Coarse sand (1.0 – 0.5 mm) | 30 – 36 | 20 - 25 |
| Medium sand (0.5 – 0.25 mm) | 38 – 48 | 40 - 45 |
| Fine sand (0.25 – 0.15 mm) | 8.0 – 10 | 10 - 20 |
| Very fine sand (0.15 – 0.05 mm) | 2.5 – 5.0 | 2.0 – 5.0 |
| Silt + clay (≤ 0.05 mm) | 0.5 – 1.5 | 1.0 – 5.0 |

* **Physical properties**
* Bulk density : 1.5 - 2.5 g/cc
* Particles shape: angular to surrounded.
* Total porosity : 35 – 55%

1. **FOUNDRY SAND**

* **Applications**

**Foundry sand used to form molds for ferrous (iron and steel) and nonferrous (copper, aluminum, brass) metal castings. Where 95 percent of foundry sand used for castings. The automotive industry and its parts suppliers are the major generators of foundry sand.**

* **Specifications**
* **physical properties**

|  |  |
| --- | --- |
| Property | Results |
| Specific Gravity | 2.00 – 2.50 |
| Bulk Relative Density, kg/m3 | 2500 - 2600 |
| Absorption, % | 0.40 – 0.50 |
| Moisture Content, % | 0.10 – 5.00 |
| Clay Lumps and Friable Particles% | 1.00 – 4.50 |
| Coefficient of Permeability (cm/sec) | 10-3 - 10-6 |
| Plastic limit/plastic index | Nonplastic |

* **chemical composition**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Constituent | SiO2 | Al2O3 | Fe2O3 | CaO | MgO | SO3 | Na2O | K2O | TiO2 | TOTAL |
| Value (%) | **88.50** | **4.30** | **0.85** | **0.14** | **0.30** | **0.09** | **0.20** | **0.25** | **0.15** | **99.48** |

* **mechanical properties**

|  |  |
| --- | --- |
| Property | Results |
| Abrasion Loss | < 2 |
| Magnesium Sulfate Soundness Loss % | 5.0 - 15 |
| Friction Angle (deg.) | 30 - 40 |
| California Bearing Ratio % | 5.0 -20 |

* **Particles size**

|  |  |  |
| --- | --- | --- |
| sieve size (mm) | 0.6 – 0.15 | ≤ 0.075 |
| percentage | 85 - 95 | 1. - 15 |