

PHYSICAL PROPERTIES FOR UNWEATHERED ROCKS¹

| Rock type | Identification | Uniaxial compressive strength (MPa) | | Young's modulus GPa | Sclero- scope hardness | Schmidt impact value |
|-------------------------------|----------------|-------------------------------------|---------|------------------------|------------------------------|----------------------------|
| | | Range | Average | | | |
| Clastic material | 26A | 69.1–126.2 ² | 89.8 | 26.2 | 77 | 66 |
| Conglomerate, Gila | 25H | UN ³ | UN | UN | — | 33 |
| Dacite tuff, welded | 10H | 6.7–20.3 | 12.9 | 3.4 | 17 | 35 |
| Diabase | 10B | 144.4–168.6 | 158.3 | 40.7 | 70 | 60 |
| Diorite | OD | 212.4–229.0 | 221.6 | 38.6 | 78 | 65 |
| Dolomite | 1A | 56.6–96.8 | 69.3 | 27.6 | 38 | 58 |
| „ | 1B | 42.5–60.8 | 49.5 | 14.5 | 36 | 53 |
| „ | 1C | 42.3–72.5 | 57.6 | 15.2 | 33 | 53 |
| „ | 1D | 80.0–120.8 | 92.5 | 26.9 | 39 | 61 |
| Granite, biotite | OA | 142.2–160.5 | 148.5 | 39.3 | 76 | 62 |
| „ „ | 12B | 76.1–100.8 | 88.8 | 22.1 | 59 | 54 |
| Granodiorite | 16A | 148.9–198.1 | 179.5 | 26.9 | 72 | 65 |
| „ , altered | 16B | 18.1–25.9 | 21.2 | 5.5 | 27 | 36 |
| Gypsum | 4A | 28.5–34.9 | 32.4 | 17.9 | 6 | 42 |
| Hematite, crystalline | 5H | 181.7–249.9 | 235.5 | 50.3 | 67 | 60 |
| Hornfels | 5D | 304.4–341.4 | 327.0 | 56.5 | 79 | 65 |
| Limestone | OB | 41.4–48.6 | 45.2 | 11.0 | 14 | 39 |
| „ , arenaceous | 15N | 39.0–57.7 | 46.1 | 9.7 | 30 | 56 |
| „ , bleached | 15G | 73.8–130.7 | 105.3 | 24.8 | 46 | 61 |
| „ , breccia | 7A | 97.2–125.9 | 110.5 | 24.1 | 42 | 61 |
| „ , jasperoidal | 15C | UN | UN | UN | UN | 43 |
| „ , mural | 19A | 93.8–119.1 | 101.2 | 32.4 | 41 | 55 |
| „ , siliceous | 14B | 69.6–132.7 | 91.5 | 22.1 | 42 | 59 |
| „ , silicified | 14A | 55.8–116.7 | 86.1 | 25.5 | 37 | 54 |
| „ , „ | 15D | UN | UN | UN | 85 | 61 |
| „ , „ | 16J | 53.6–106.6 | 74.3 | 24.1 | 49 | 60 |
| Magnetite, massive | 5A | 59.2–77.8 | 75.1 | 16.5 | 42 | 58 |
| „ , „ | 9B | 239.7–327.8 | 284.6 | 59.3 | 50 | 60 |
| Marble | OC | 54.4–73.2 | 61.5 | 11.7 | 30 | 44 |
| Meta-arkose, schistose | 5C | 98.1–103.0 ² | 98.1 | 20.7 | 36 | 48 |
| Monzonite, ext. altered | 6C | 15.5–21.2 | 17.9 | 3.4 | 6 | 31 |
| „ , quartz | 25A | 53.4–144.3 | 94.8 | 26.9 | 50 | 59 |
| „ , „ | 25B | 106.7–130.0 | 116.0 | 23.4 | 67 | 68 |
| „ , „ , altered | 25E | 72.0–114.9 | 97.3 | 22.8 | 61 | 61 |
| „ , „ , porphyritic | 5G | 125.5–170.2 | 154.4 | 33.8 | 61 | 60 |
| Porphyry, altered, silicified | 21B | 132.4–196.2 | 159.5 | 24.8 | 76 | 58 |
| „ , extremely altered | 15B | 7.4–28.3 | 18.2 | 6.2 | 17 | 39 |
| „ , granite | 14D | 65.2–91.7 | 76.0 | 20.0 | 65 | 61 |
| „ , granodiorite, alt. | 16C | 38.3–82.5 | 66.4 | 15.2 | 42 | 55 |
| „ , quartz monzonite | 10D | 70.5–100.5 | 86.0 | 29.0 | 55 | 51 |
| „ „ „ | 25C | 65.0–118.7 | 98.0 | 20.7 | 56 | 62 |
| „ „ „ , alt. | 25D | 56.8–101.4 | 72.9 | 15.9 | 59 | 58 |
| „ , rhyolitic | 9A | 104.7–195.5 | 149.4 | 33.8 | 81 | 62 |

1. From: White, C G, 1969. A rock drillability index. *Quart. Colo. Sch. Mines*, 64, (2), by permission.

2. Values based on a limited number of tests.

3. UN Rock unsuitable for preparation of test specimen.

| Rock type | Identification | Uniaxial compressive strength (MPa) | | Young's modulus | Scleroscope hardness | Schmidt impact value |
|------------------------------|----------------|-------------------------------------|---------|-----------------|----------------------|----------------------|
| | | Range | Average | | | |
| Potash | OB | 19.0–25.2 | 21.3 | 4.1 | 4 | 20 |
| „ | 3B | 21.9–31.2 | 26.8 | 0.7 | 4 | 19 |
| Pyrite, massive | 12D | 63.2–107.9 | 92.0 | 33.1 | 48 | 62 |
| Quartzite | 5B | 122.6–158.6 | 140.2 | 35.2 | 83 | 62 |
| „ | 10C | UN | UN | UN | 72 | 51 |
| „ | 12A | 148.0–215.2 | 181.5 | 36.5 | 76 | 59 |
| „ | 14C | 80.7–196.5 | 125.7 | 20.7 | 67 | 59 |
| „ | 16D | 70.7–129.0 | 90.1 | 30.3 | 44 | 59 |
| „ | 16E | 58.7–97.6 | 73.5 | 17.9 | 79 | 56 |
| „ | 28A | 236.8–270.6 ² | 249.7 | 34.5 | 71 | 68 |
| „, impure | 5E | 168.4–262.1 ² | 200.4 | 42.1 | 56 | 57 |
| Rhyolite | 15L | 64.3–82.5 ² | 73.7 | 16.5 | 62 | 61 |
| „, ext. alt. | 15H | UN | UN | UN | 27 | 43 |
| Salt | 2A | 28.0–32.1 | 30.0 | 6.9 | 4 | 24 |
| „ | 3A | 30.3–35.0 | 32.5 | 3.4 | 4 | 24 |
| Sandstone | 15A | 15.4–26.0 | 20.6 | 4.1 | 25 | 45 |
| „ | 20B | 86.9–119.1 | 98.8 | 21.4 | 50 | 59 |
| „ | 29A | 19.4–30.1 | 25.6 | 4.1 | 15 | 42 |
| Schist | 8B | 135.0–263.9 | 177.9 | 37.9 | 77 | 67 |
| „ | 8C | 90.4–189.4 | 131.0 | 26.2 | 61 | 64 |
| „, altered | 10E | 80.9–148.0 | 106.1 | 22.1 | 46 | 56 |
| „ „ | 10G | UN | UN | UN | 35 | 39 |
| „, brecciated | 10A | 32.7–70.6 | 48.1 | 15.9 | 45 | 42 |
| „, chlorite, cummingtonite | 13B | 19.7–65.7 | 43.3 | 20.7 | 54 | 52 |
| Shale | 15K | 57.7–113.6 | 75.8 | 20.0 | 53 | 53 |
| „, altered | 16G | 33.4–50.8 | 40.5 | 11.0 | 24 | 38 |
| „, oil | 11B | 23.4–29.2 | 26.4 | 2.8 | 19 | 39 |
| Siltstone | 14G | 44.3–110.1 | 64.1 | 11.7 | 31 | 48 |
| „ | 20A | 79.8–122.4 | 98.5 | 17.2 | 40 | 53 |
| „ | 20E | 101.8–119.6 | 110.0 | 22.1 | 45 | 57 |
| Sphalerite, massive, pyritic | 12E | 57.4–110.2 | 74.3 | 22.1 | 35 | 52 |
| Trona | 11A | 22.5–39.6 | 31.0 | 12.4 | 21 | 47 |
| Tuff | 27A | 114.4–170.4 | 151.4 | 25.5 | 55 | 64 |

S.I. equivalents calculated from Imperial System values using $10^3 \text{ psi} = 6.894 \text{ MPa}$. For soft rocks the point load test results are too variable for tabulation.