

MATERIAL STRENGTH CLASSIFICATION CHART

ACARP CoalLog Dictionary v1.0

Sonic Velocity		Estimated Rock Strength			Example	Approx UCS MPa
M/s	μsec/ft	Code	Description	Definition		
<1500	>203	R1	Very Weak	May be broken in hand and remoulded (with addition of water if necessary) to a material with soil properties.	Completely weathered sediments.	< 1.0
<i>Lower limit of sonic velocity measurement (sonic velocity of water is 1500 ms⁻¹)</i>						
1500 - 2000	203 - 152	R2	Weak	Crumbles under a single firm hammer blow, can be peeled with a knife.	Highly weathered sediments.	1.0 - 5.0
2000 - 2500	152 - 122	R3	Moderately Weak	Breaks under a single firm hammer blow, scored but not peeled with a knife. Cuttings easily broken with fingers.	Moderately weathered sediments. Highly carbonaceous sediments.	5.0 - 10
2500 - 3500	122 - 87	R4	Moderately Strong	Breaks under 1 to 3 hammer blows, can be scratched but not scored with a knife. Cuttings are mostly too hard to break between fingers.	Slightly weathered to fresh coal measures sediments. Moderately weathered basalt.	10 - 25
<i>Nominal limit of blade bit drilling and tungsten coring</i>						
3500 - 4500	87 - 68	R5	Strong	Breaks under 3 to 5 hammer blows, hard to scratch with a knife but can be scratched with tungsten-tipped tool, hard sound when struck with hammer. Cuttings cannot be broken between fingers.	Silicified or strongly cemented sediments. Moderately weathered tight basalt.	25 - 50
4500 - 6000	68 - 51	R6	Very Strong	Breaks under 1 hammer if resting on solid surface, cannot be scratched by knife, scratched with difficulty by a tungsten tipped tool, dull ringing sound when struck with hammer.	Sideritic and cherty sediments. Quartzite, fresh basalt, granite.	50 - 100
>6000	<51	R7	Extremely Strong	Difficult to break with hammer even if resting on solid surface, bright ringing sound when struck with hammer.	Certain silcretes, fresh tight basalt and granite, siderite bands.	>100

MATERIAL STRENGTH CLASSIFICATION CHART (Cont.)

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Estimated Unconsolidated Cohesive Strength (Clay)			Approx UCS kPa
Code	Description	Definition	
C1	Very Soft	Exudes between the fingers when squeezed in hand.	< 12
C2	Soft	Can be moulded by light finger pressure	12 - 25
C3	Firm	Can be moulded by strong finger pressure.	25 - 50
C4	Stiff	Cannot be moulded by fingers, can be indented by thumb.	50 - 100
C5	Very Stiff	Can be indented by thumb nail.	100 - 200
C6	Hard	Can be indented with difficulty by thumbnail.	>200

Estimated Unconsolidated Cohesionless Strength (Sand)			Density Index
Code	Description	Definition	
S1	Very Soft	Easily dissociated with flicks of finger nail.	< 15%
S2	Soft	Easily penetrated by knife blade, readily dissociated by scratching with finger nail.	15% - 35%
S3	Firm	Penetrated by knife only with firm pressure, readily indented by thumb pressure, dissociated with difficulty by scratching with finger nail.	35% - 65%
S4	Stiff	Difficult to indent by thumb pressure, dissociated readily by knife blade.	65% - 85%
S5	Very Stiff	Cannot be indented by thumb pressure, dissociated only by firm pressure with knife blade.	>85%