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SCHEDULE FOR PROPERTIES AND AVAILABILITY OF STONES FOR CONSTRUCTION PURPOSES

PART I GUJARAT STATE

Section 3 Engineering Properties of Stone Aggregates

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Indian Standard

SCHEDULE FOR PROPERTIES AND AVAILABILITY OF STONES FOR CONSTRUCTION PURPOSES

PART I GUJARAT STATE

Section 3 Engineering Properties of Stone Aggregates

0. FOREWORD

0.1 This Indian Standard (Part I/Section 3) was adopted by the Indian Standards Institution on 19 August 1975, after the draft finalized by the Stones Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Stones are available in large quantities in different parts of the country. To choose and utilize them for various uses, it is necessary to know their availability and also the strength properties determined according to the standard procedures. Accordingly, this Indian Standard is being formulated to cover this information for each State in the country. This standard will be published in parts, each part covering a State. For the facility of compiling and use of the standard, each part will be divided into three sections. Part I covers Gujarat State and will be issued in three sections. Section 1 gives information on the availability of stones in the form of map showing geological classification and known quarries; Section 2 covers engineering properties of building stones; and Section 3 covers engineering properties of stone aggregates. It is hoped that with the publication of this data it will be convenient for the users of stone to know not only the availability of stones but to select them in a scientific way depending upon the requirement for the particular use.

0.2.1 The information included in this Part covers data collected up to the end of 1974. Further information, as and when received, will be added as amendment to this standard.

0.3 The information contained in this Section is based on the data provided by the Engineering Research Institute (Public Works Department) of Gujarat State.

0.4 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard (Part I/Section 3) covers the engineering properties of stone aggregates in Gujarat State.

2. TEST RESULTS

2.1 The test results of most of the types of stone aggregates collected for some of the important properties according to relevant Indian Standards are given in Table 1.

*Rules for rounding off numerical values (*revised*).

TABLE 1 SCHEDULE OF CHARACTERISTICS OF STONE AGGREGATES — GUJARAT STATE

(*Clause* 2.1)

Sl No.	Location	Type of Aggregate	Apparent Specific Gravity IS : 2386 (Part III)-1963*	Water Absorption % IS : 2386 (Part III)-1963*	Crushing Value % IS : 2386 (Part IV)-1963†	Abrasion Value % IS : 2386 (Part IV)-1963†	Impact Value % IS : 2386 (Part IV)-1963†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AMRELI						
1.	Amreli	Basalt	2·92	0·51	12·00	13·00	11·00
2.	Dhari	do	2·86	0·37	11·80	12·60	9·50
3.	Mahigigsagar	do	2·95	0·66	14·50	19·20	9·10
4.	Munjiasar	do	2·98	0·31	16·00	20·00	15·00
5.	Rajula	Trachyte	2·47	0·23	18·40	19·50	16·00
6.	Zar	Basalt	2·93	0·70	15·40	12·60	9·50
	BANASKANTHA						
7.	Atal	Calc-gneiss	2·76	0·67	25·90	32·45	20·70
8.	Bhakar	Granite	2·64	0·40	26·50	26·10	24·80
9.	Budha Mahadeo	Limestone	2·59	1·36	58·00	32·00	33·70
10.	do	Sandstone	2·51	0·88	34·23	41·89	36·36
11.	Chitranjan	Basalt	2·91	0·40	15·00	16·30	8·00
12.	Dabhav	Gneiss	2·67	0·63	24·30	18·20	29·40
13.	Dantiwada	Gravel	2·65	0·93	27·90	46·40	25·90
14.	Deolinivav	Granite	2·70	1·76	22·80	20·70	25·30
15.	Eval	do	2·66	1·30	21·40	22·10	20·20
16.	Gola	do	2·62	1·30	31·00	14·50	32·60
17.	Khamiana	Sandstone	2·62	0·76	21·90	36·10	24·60
18.	Koteshwar	Granite	2·63	1·01	17·90	19·00	16·50
19.	Malachi	Limestone	2·57	1·85	23·10	31·70	24·30
20.	Malana	Quartzite	2·64	0·86	18·27	17·93	19·96
21.	Morra	Basalt	2·83	0·43	18·70	19·40	19·70
22.	Pavati	Granite	2·66	0·97	28·70	47·20	30·50
23.	Phangli	Basalt	2·95	0·90	19·70	—	—
24.	Rampur Mahudi	Calc-gneiss	2·83	0·15	25·40	26·60	25·50
25.	Sedhain	Limestone	2·60	0·44	24·80	36·20	25·60
	BARODA						
26.	Agar	Sandstone	2·44	1·85	29·25	39·67	32·56
27.	Depsa	Basalt	2·99	1·56	14·40	13·90	12·50
28.	Kankpodia	Quartzite	2·61	0·37	28·30	45·13	26·10
29.	Ladi	Basalt	2·96	0·15	12·50	10·55	8·10
30.	Limbani	Granite	2·62	0·29	19·10	12·39	15·70
31.	Lothan	Quartzite	2·63	0·19	30·42	36·60	30·96
32.	Tejgadh	Granite	2·64	0·17	26·01	21·60	25·57
33.	Waghodia	Quartzite	2·60	0·29	15·50	16·00	14·00

*Methods of test for aggregates for concrete: Part III Specific gravity, density, voids, absorption and bulking.
†Methods of test for aggregates for concrete: Part IV Mechanical properties.

(*Continued*)

TABLE 1 SCHEDULE OF CHARACTERISTICS OF STONE AGGREGATES — GUJARAT STATE — *Contd*

Sl No.	Location	Type of Aggregate	Apparent Specific Gravity IS : 2386 (Part III)-1963*	Water Absorption % IS : 2386 (Part III)-1963*	Crushing Value % IS : 2386 (Part IV)-1963†	Abrasion Value % IS : 2386 (Part IV)-1963†	Impact Value % IS : 2386 (Part IV)-1963†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BHAVNAGAR						
34.	Gordaka	Basalt	2·74	1·44	16·80	19·60	15·27
35.	Madandhar	do	2·77	0·97	12·76	11·75	12·12
36.	Mampur	do	2·73	0·87	14·40	14·20	13·05
37.	Sanjana	do	2·84	0·31	11·30	12·00	10·00
38.	Vijapaoj	do	2·76	1·37	15·50	17·50	12·03
	BROACH						
39.	Dajipura	Basalt	2·96	0·44	11·60	—	5·40
40.	Garudeshwar	Gravel	2·89	0·66	11·20	13·20	7·10
41.	Koop	do	3·23	0·70	12·80	—	7·30
42.	Koyalivav	do	2·93	0·60	15·80	—	9·80
43.	Lilawadhar	do	2·89	0·70	10·80	—	7·80
44.	Mota Surva	Basalt	2·87	1·01	—	13·00	10·00
45.	Netrang	do	2·90	1·20	22·50	16·77	—
46.	Thuva	Gravel	2·91	1·03	22·00	—	15·80
47.	Tilakwada	do	2·87	0·83	13·80	26·70	11·30
48.	Trimrolia	do	2·98	0·50	16·30	—	9·80
49.	Zaria	do	2·89	0·86	12·50	18·70	9·10
	DANGS						
50.	Chinchavgao	Basalt	2·93	0·76	13·10	15·40	10·70
51.	Nandiara	do	2·91	0·41	12·90	12·70	8·60
52.	Saputara	do	2·92	0·43	13·10	12·20	10·36
53.	Takalipada	do	2·79	0·89	14·90	13·40	14·10
	JAMNAGAR						
54.	Dhunvan	Basalt	2·79	1·94	20·00	22·40	18·00
55.	Dwarka	Limestone	2·60	0·70	28·80	36·30	24·50
56.	Hapadhar	Basalt	2·86	1·00	15·00	16·50	13·00
57.	Khariberaja	do	2·79	1·25	22·20	22·20	19·10
58.	Khuria	do	2·72	2·12	21·20	22·10	20·50
59.	Nagari	do	2·85	0·31	16·70	14·70	13·50
60.	Paliadhar	do	2·88	1·05	13·09	15·10	9·70
61.	Sachna	do	2·78	1·58	22·00	23·00	21·00
62.	Tarang	do	2·87	0·75	17·30	18·40	12·90
63.	Theba	do	2·76	1·75	23·20	23·60	19·40

*Methods of test for aggregates for concrete: Part III Specific gravity, density, voids, absorption and bulking.
†Methods of test for aggregates for concrete: Part IV Mechanical properties.

(*Continued*)

TABLE 1 SCHEDULE OF CHARACTERISTICS OF STONE AGGREGATES — GUJARAT STATE — *Contd*

Sl No.	Location	Type of Aggregate	Apparent Specific Gravity IS : 2386 (Part III)-1963*	Water Absorption % IS : 2386 (Part III)-1963*	Crushing Value % IS : 2386 (Part IV)-1963†	Abrasion Value % IS : 2386 (Part IV)-1963†	Impact Value % IS : 2386 (Part IV)-1963†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	JUNAGADH						
64.	Chhaya	Miliolite Limestone	2·61	0·80	23·90	27·00	33·80
65.	Gupta Prayag	do	2·57	0·94	34·85	27·60	23·30
66.	Kalvad	Basalt	2·78	1·30	11·00	10·50	10·00
67.	Kachhadi	Miliolite Limestone	2·62	0·92	22·30	25·80	25·40
68.	Lalpur	Basalt	2·78	1·19	12·50	12·00	11·00
69.	Palaghad	Miliolite Limestone	2·62	1·25	27·20	23·60	25·20
70.	Porbandar	do	2·63	2·00	17·80	14·40	15·00
71.	Ranavav	do	2·51	—	24·60	26·00	25·50
72.	Vakaria	Basalt	2·80	1·02	11·00	10·00	9·00
	KAIRA						
73.	Angadi	Basalt	2·68	1·92	20·10	—	23·10
74.	Balasinor	Limestone	2·68	0·70	22·90	21·30	18·60
75.	Chitilav	Gravel	2·74	1·10	15·90	—	19·40
76.	Dakor	Sandstone	2·61	0·73	24·45	22·96	23·04
77.	Rozawa	Limestone	2·66	0·57	23·33	—	13·61
78.	Sevalia	Basalt	2·87	0·68	14·22	11·50	11·04
79.	Tayabpura	Limestone	2·53	2·80	35·89	—	31·45
80.	Vasad	Gravel	2·71	0·47	16·80	27·90	25·90
	KUTCH						
81.	Bhujia Dungar	Basalt	3·05	0·66	11·40	12·60	9·90
82.	Chitrod	do	2·97	0·46	14·10	9·40	10·10
83.	Dhanai	do	2·88	0·97	14·00	20·00	—
84.	Kankeri	do	2·93	1·00	17·30	18·50	17·30
85.	Kukma	do	2·82	1·20	13·10	17·50	13·10
86.	Manjal	do	2·83	0·33	18·50	12·80	20·10
87.	Netra	do	2·83	0·63	16·20	17·00	15·20
88.	Vamoti	do	2·92	0·67	11·00	13·30	9·30
89.	Vondh	do	2·96	0·63	16·30	11·30	10·80
	MEHSANA						
90.	Hatheli	Granite	2·66	0·48	22·80	19·10	20·80
91.	Kheralu	do	2·64	0·46	24·00	22·20	21·20
92.	Wadhali	do	2·65	0·47	17·64	10·27	13·80

*Methods of test for aggregates for concrete: Part III Specific gravity, density, voids, absorption and bulking.
†Methods of test for aggregates for concrete: Part IV Mechanical properties.

(*Continued*)

TABLE 1 SCHEDULE OF CHARACTERISTICS OF STONE AGGREGATES — GUJARAT STATE — *Contd*

Sl No.	Location	Type of Aggregate	Apparent Specific Gravity IS : 2386 (Part III)-1963*	Water Absorption % IS : 2386 (Part III)-1963*	Crushing Value % IS : 2386 (Part IV)-1963†	Abrasion Value % IS : 2386 (Part IV)-1963†	Impact Value % IS : 2386 (Part IV)-1963†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PANCHMAHALS						
93.	Ankali	Limestone	2·56	2·60	26·37	31·62	23·00
94.	Asardi	Quartzite	2·63	0·40	18·68	20·33	12·80
95.	Bajarwada	Basalt	2·84	0·78	14·37	15·27	7·26
96.	Bhadalwada	Quartzite	2·62	0·16	18·38	22·37	19·31
97.	Chhaen	Limestone	2·59	1·69	20·43	21·60	13·18
98.	Chhapadi	Basalt	2·89	1·26	12·75	13·98	8·50
99.	Dabhavav	Limestone	2·65	1·16	26·42	31·50	24·00
100.	Dalwada	Quartzite	2·65	0·20	14·00	16·00	13·10
101.	Dhakalia	do	2·64	0·20	17·00	19·00	15·50
102.	Dungaria	do	2·62	0·70	23·30	20·00	25·10
103.	Godhra	Granite	2·61	0·25	21·00	23·00	16·00
104.	Halol	Basalt	2·80	0·67	16·00	17·50	15·00
105.	Jamotra	Quartzite	2·66	0·53	30·40	24·50	33·60
106.	Juna Baria	do	2·59	0·60	23·20	29·90	22·77
107.	Kadana	do	2·62	0·63	20·20	22·00	18·22
108.	Kadana	Gravel	2·83	0·39	11·69	35·93	10·60
109.	Kalikojava	Phyllite	2·68	1·77	32·58	51·72	34·48
110.	Kathala	Quartzite	2·65	0·21	21·88	26·27	16·18
111.	Khabda	Quartzite	2·63	0·20	17·14	24·70	12·70
112.	Kund	Basalt	2·84	1·28	15·00	18·00	13·00
113.	Limdi	Basalt	2·84	1·16	11·16	12·93	8·21
114.	Natapur	Quartzite	2·62	0·36	17·75	22·50	12·08
115.	Panchwada	do	2·63	0·53	19·37	22·88	18·47
116.	Pania	do	2·63	0·50	20·82	21·01	19·86
117.	Parwadi	Granite	2·62	0·39	22·32	17·68	13·15
118.	Pasaro	Quartzite	2·61	1·97	—	40·26	19·88
119.	Patoajol	Limestone	2·61	1·29	27·82	34·22	21·84
120.	Pavagadh	Volcanic breccia	2·50	2·31	21·50	24·00	17·90
121.	Rajula	Quartzite	2·69	0·17	17·00	24·41	19·75
122.	Raliata	do	2·63	0·21	20·16	18·46	14·88
123.	Sant	do	2·61	0·48	15·49	17·13	20·50
124.	Sharada	Limestone	2·62	2·08	11·89	27·17	15·57
125.	Simlia	Quartzite	2·61	0·65	20·37	27·88	16·37
126.	Vardhari	Granite	2·61	0·52	16·40	21·20	20·60

*Methods of test for aggregates for concrete: Part III Specific gravity, density, voids, absorption and bulking.
†Methods of test for aggregates for concrete: Part IV Mechanical properties.

(*Continued*)

TABLE 1 SCHEDULE OF CHARACTERISTICS OF STONE AGGREGATES — GUJARAT STATE — *Contd*

Sl No.	Location	Type of Aggregate	Apparent Specific Gravity IS : 2386 (Part III)-1963*	Water Absorption % IS : 2386 (Part III)-1963*	Crushing Value % IS : 2386 (Part IV)-1963†	Abrasion Value % IS : 2386 (Part IV)-1963†	Impact Value % IS : 2386 (Part IV)-1963†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	RAJKOT						
127.	Andasda	Basalt	2·93	0·44	12·30	13·70	8·20
128.	Chakodakhan	do	2·74	0·90	14·50	15·00	14·20
129.	Dharampur	do	2·95	0·54	14·60	13·60	10·90
130.	Ghunta	do	2·90	0·50	13·90	16·00	10·50
131.	Haripur	do	2·90	0·34	9·50	10·00	9·00
132.	Jamkandorna	do	2·84	0·55	11·00	12·30	10·00
133.	Keshod	do	2·72	0·73	13·10	14·90	10·30
134.	Khareda	do	2·95	0·13	12·80	13·10	10·00
135.	Khokhadod	do	2·87	0·71	12·00	13·00	9·13
136.	Lajai	do	2·87	0·79	9·76	11·50	8·57
137.	Lalpuri	do	2·93	0·13	12·30	13·00	9·60
138.	Mahendranagar	do	2·89	0·52	13·00	19·70	10·70
139.	Mahika	do	2·89	0·54	9·00	10·10	9·50
140.	Mauva	Basalt	2·89	0·82	10·50	11·00	9·50
141.	Motada	do	2·88	0·53	9·50	10·50	9·00
142.	Navagam	do	2·93	0·43	9·50	10·00	8·50
143.	do	Sandstone	2·30	4·28	47·60	63·60	45·30
144.	Raiya	Basalt	2·89	0·95	12·00	12·80	10·09
145.	Ribda	do	2·96	0·43	9·00	9·30	8·40
146.	Sapur	do	2·95	0·54	8·00	9·00	7·60
147.	Unchimandal	do	2·89	0·60	12·30	13·20	10·30
148.	Viren	do	2·69	0·77	14·60	16·20	12·80
	SABARKANTHA						
149.	Balavam	Granite	2·60	0·73	31·74	25·93	36 94
150.	Evala	do	2·64	0·19	—	27·75	23 ·26
151.	Gambhirpura	do	2·61	0·17	32·14	43·86	28·63
152.	Himatnagar	do	2·67	0·25	24·60	23·50	—
153.	Hirpur	Gravel	2·64	1·00	28·80	30·40	28·60
154.	Idar	Granite	2·63	0·52	34·28	55·45	31·00
155.	Jamla	do	2·59	0·23	32·10	—	39·00
156.	Jankani	do	2·59	0·57	14·61	19·61	16·41
157.	Kapoda	Basalt	2·92	1·33	22·00	31·00	28·00
158.	Laloda	Granite	2·59	0·86	23·16	17·10	19·23
159.	Likhi	do	2·67	0·12	18·91	21·02	18·10
160.	Malasa	Limestone	2·76	0·67	19·70	13·90	18·00
161.	Panpur	Sandstone	2·45	4·00	31·90	31·96	22·20
162.	Rajpura	Basalt	2·71	2·84	14·90	13·40	11·00
163.	Vadagam	do	2·89	0·40	13·80	17·80	12·80
164.	Watrak	do	2·91	0·70	12·70	9·80	16·20

*Methods of test for aggregates for concrete: Part III Specific gravity, density, voids, absorption and bulking.
†Methods of test for aggregates for concrete: Part IV Mechanical properties.

(*Continued*)

TABLE 1 SCHEDULE OF CHARACTERISTICS OF STONE AGGREGATES — GUJARAT STATE — *Contd*

Sl No.	Location	Type of Aggregate	Apparent Specific Gravity IS : 2386 (Part III)-1963*	Water Absorption % IS : 2386 (Part III)-1963*	Crushing Value % IS : 2386 (Part IV)-1963†	Abrasion Value % IS : 2386 (Part IV)-1963†	Impact Value % IS : 2386 (Part IV)-1963†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	SURAT						
165.	Ambhata	Basalt	2·86	0·66	11·60	11·60	11·40
166.	Areth	do	2·89	0·60	9·86	17·30	8·30
167.	Bamanwel	do	2·93	0·73	12·60	14·40	11·00
168.	Chhacharbunda	Dolerite	3·00	0·57	10·30	9·24	10·57
169.	Dungari	Basalt	2·87	0·63	12·60	14·30	13·20
170.	Duwada	do	2·92	0·46	13·40	10·40	10·40
171.	Gadat	Gravel	2·88	0·98	13·90	29·10	18·10
172.	Lukad	Basalt	2·96	1·34	17·20	18·00	16·00
173.	Maipur	do	2·89	0·70	12·90	—	8·40
174.	Nogama	do	2·90	0·73	10·99	12·29	9·75
175.	Pokhran	do	2·88	2·56	16·30	—	9·90
176.	Ukai	Gabboodiorite	3·00	0·53	12·01	10·20	10·24
177.	do	Basalt	2·89	0·41	11·49	8·86	9·05
	SURENDRANAGAR						
178.	Chuda	Basalt	2·90	1·00	13·00	15·60	—
179.	Datar	do	2·91	0·80	22·20	12·10	15·50
180.	Kharava	Sandstone	2·37	3·75	44·00	59·50	50·70
181.	Khimiana	do	2·56	1·40	26·60	30·90	24·60
182.	Sayla	Basalt	2·86	1·30	12·66	16·00	10·00

*Methods of test for aggregates for concrete: Part III Specific gravity, density, voids, absorption and bulking.
†Methods of test for aggregates for concrete: Part IV Mechanical properties.

INDIAN STANDARDS

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STONES

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1121 Method of test for determination of strength properties of natural building stones:
- 1121 (Part I)-1974 Compression strength (*first revision*)
- 1121 (Part II)-1974 Transverse strength (*first revision*)
- 1121 (Part III)-1974 Tensile strength (*first revision*)
- 1121 (Part IV)-1974 Shear strength (*first revision*)

1122-1974 Method of test for determination of specific gravity of natural building stones (*first revision*)

1123-1974 Method of identification of natural building stones (*first revision*)

1124-1974 Method of test for determination of water absorption apparent specific gravity and porosity of natural building stones (*first revision*)

1125-1974 Method of test for determination of weathering of natural building stones (*first revision*)

1126-1974 Method of test for determination of durability of natural building stones (*first revision*)

1127-1970 Recommendations for dimensions and workmanship of natural building stones (*first revision*)

1128-1974 Limestone slabs (*first revision*)

1129-1972 Recommendations for dressing of natural building stones (*first revision*)

1130-1969 Marble (blocks, slabs and tiles)

1706-1972 Method for determination of resistance to wear by abrasion of natural building stones (*first revision*)

1805-1973 Glossary of terms relating to building stones: quarrying and dressing (*first revision*)

3316-1974 Structural granite (*first revision*)

3620-1966 Laterite stone block for masonry

3622-1966 Sandstone slabs for use in flooring

4121-1967 Method of test for determination of water transmission rate by capillary action through natural building stones

4122-1967 Method of test for surface softening of natural building stones by exposure to acidic atmospheres

4348-1973 Method of test for determination of permeability of natural building stones (*first revision*)

5218-1969 Method of test for toughness of natural building stones

5640-1970 Method of test for determining the aggregate impact value of soft coarse aggregates

6241-1971 Method of test for determination of stripping value of road aggregates

6250-1971 Roofing slate tiles

6579-1972 Coarse aggregates for water bound macadam

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