





Table 113.1-1
Quality Level Analysis by the Standard Deviation Method

P_u or P_L percent Within Limits for Positive Values of Q_u or Q_L

Upper Quality Index Q_u or Lower Quality Index Q_L	P_u or P_L percent Within Limits for Positive Values of Q_u or Q_L				
	n=3	n=4	n=5	n=6	n=7
100	1.16	1.20	1.21	2.01	2.33
99	1.15	1.44	1.60	1.70	1.79
97	1.41	1.54	1.62	1.67	1.67
96	1.14	1.38	1.49	1.55	1.59
94	1.13	1.32	1.39	1.43	1.46
93	1.29	1.35	1.38	1.40	1.40
92	1.12	1.25	1.31	1.33	1.35
91	1.11	1.23	1.27	1.29	1.30
90	1.10	1.20	1.24	1.25	1.26
89	1.09	1.17	1.20	1.20	1.20
88	1.07	1.14	1.16	1.16	1.16
87	1.06	1.11	1.12	1.12	1.12
86	1.04	1.08	1.09	1.08	1.08
85	1.03	1.05	1.05	1.04	1.04
84	1.01	1.02	1.01	1.01	1.00
83	1.00	1.00	0.99	0.97	0.97
82	0.97	0.98	0.98	0.94	0.93
81	0.96	0.93	0.91	0.90	0.90
80	0.93	0.90	0.88	0.87	0.86
79	0.91	0.87	0.86	0.84	0.83
78	0.89	0.84	0.82	0.80	0.80
77	0.87	0.81	0.79	0.77	0.76
76	0.84	0.78	0.75	0.74	0.73
75	0.82	0.75	0.72	0.71	0.70
74	0.79	0.72	0.69	0.68	0.67
73	0.76	0.69	0.66	0.65	0.64
72	0.74	0.66	0.63	0.62	0.61
71	0.71	0.63	0.60	0.59	0.58
70	0.68	0.60	0.57	0.56	0.55
69	0.65	0.57	0.54	0.53	0.52
68	0.62	0.54	0.51	0.50	0.49
67	0.59	0.51	0.47	0.47	0.46
66	0.56	0.48	0.45	0.44	0.44

Section 9 - 4

Upper Quality Index Q_u or Lower Quality Index Q_L	P_u or P_L percent Within Limits for Positive Values of Q_u or Q_L				
	n=3	n=4	n=5	n=6	n=7
65	0.52	0.45	0.43	0.41	0.41
64	0.49	0.42	0.40	0.39	0.38
63	0.43	0.36	0.34	0.33	0.32
62	0.39	0.33	0.31	0.30	0.29
61	0.36	0.30	0.28	0.27	0.27
60	0.32	0.27	0.25	0.24	0.24
59	0.29	0.24	0.23	0.22	0.21
58	0.25	0.21	0.20	0.19	0.19
56	0.22	0.18	0.17	0.16	0.16
55	0.18	0.15	0.14	0.13	0.13
54	0.14	0.12	0.11	0.11	0.11
53	0.11	0.09	0.08	0.08	0.08
52	0.07	0.06	0.06	0.05	0.05
51	0.04	0.03	0.03	0.03	0.03
50	0.00	0.00	0.00	0.00	0.00

Table 113.1-2 Pay Factors

Pay Factor	Required Quality Level for a Given Sample Size n and Pay Factor				
	n=3	n=4	n=5	n=6	n=7
1.05	100	100	100	100	100
1.04	90	91	92	93	93
1.03	80	80	81	82	82
1.02	75	80	83	85	86
1.01	71	77	80	83	84
1.00	68	74	78	80	81
0.99	66	72	75	77	79
0.98	64	70	73	75	77
0.97	62	68	71	74	75
0.96	60	66	69	72	73
0.95	59	64	67	70	72
0.94	57	63	65	68	70
0.93	56	61	63	66	67
0.92	55	60	62	64	66
0.91	53	58	61	63	65
0.90	52	57	60	62	64
0.89	51	55	59	61	63
0.88	50	54	57	60	62
0.87	48	53	56	58	60
0.86	47	51	54	57	59
0.85	46	50	53	56	58
0.84	45	49	52	55	56
0.83	44	48	51	53	55
0.82	43	46	50	52	54
0.81	41	45	48	51	53
0.80	40	44	47	50	52
0.79	38	43	46	48	50
0.78	37	41	45	47	49
0.77	36	40	43	46	48
0.76	34	39	42	45	47
0.75	33	38	41	44	46

Section 9 - 5

Pay Factor Worksheet #4

Aggregate Specification: Crushed Base Grading W Test Value: #4

Test Results: n = 5
 Test Values: .44 .45 .58 .65 .66

Average Value: \bar{x} = _____ Standard Deviation: s = _____ (s_r)

Upper Specification Limit, SL_u = _____
 Lower Specification Limit, SL_L = _____

Upper Quality Index, $Q_u = \frac{SL_u - \bar{x}}{s}$ = _____ = _____

Percent Material Within SL_u , $P_u =$ _____ (From Table 113.1-1)
 (If SL_u is not specified, $P_u = 100$)

Lower Quality Index, $Q_L = \frac{\bar{x} - SL_L}{s}$ = _____ = _____

Percent Material Within SL_L , $P_L =$ _____ (From Table 113.1-1)
 (If SL_L is not specified, $P_L = 100$)

Quality Level = Percent Within Specification Limits
 $QL = (P_u + P_L) - 100 =$ _____ - 100 = _____ (From Table 113.1-2)

Pay Factor = PF = _____ Minimum Pay Factor = _____

Max Pay Factor = _____

Pay Adjustment Factor = PAF = Min Pay Factor - 1.00 = _____ - 1.00 = _____

Section 9 - 6

Pay Factor Worksheet #5

Aggregate Specification: PMP(1*) Test Value: #30

Test Results: n = 5
 Test Values: 13 18 15 22 16

Average Value: \bar{x} = _____ Standard Deviation: s = _____
 (σ_x)

Upper Specification Limit, SL_U = _____
 Lower Specification Limit, SL_L = _____

Upper Quality Index, $Q_U = \frac{SL_U - \bar{x}}{s}$ = _____ = _____

Percent Material Within SL_U , P_U = _____ (From Table 113.1-1)
 (If SL_U is not specified, $P_U = 100$)

Lower Quality Index, $Q_L = \frac{\bar{x} - SL_L}{s}$ = _____ = _____

Percent Material Within SL_L , P_L = _____ (From Table 113.1-1)
 (If SL_L is not specified, $P_L = 100$)

Quality Level = Percent Within Specification Limits
 $QL = (P_U + P_L) - 100$ = _____ + _____ - 100 = _____

Pay Factor = PF = _____ (From Table 113.1-2)
 Minimum Pay Factor = _____

Max Pay Factor = _____

Pay Adjustment Factor = PAF = _____
 = Min Pay Factor - 1.00 = _____ - 1.00 = _____

Section 9 - 7

Pay Factor Worksheet #6

Aggregate Specification: PMP(3/4*) Test Value: #4

Test Results: n = 5
 Test Values: 58 41 48 68 65

Average Value: \bar{x} = _____ Standard Deviation: s = _____
 (σ_x)

Upper Specification Limit, SL_U = _____
 Lower Specification Limit, SL_L = _____

Upper Quality Index, $Q_U = \frac{SL_U - \bar{x}}{s}$ = _____ = _____

Percent Material Within SL_U , P_U = _____ (From Table 113.1-1)
 (If SL_U is not specified, $P_U = 100$)

Lower Quality Index, $Q_L = \frac{\bar{x} - SL_L}{s}$ = _____ = _____

Percent Material Within SL_L , P_L = _____ (From Table 113.1-1)
 (If SL_L is not specified, $P_L = 100$)

Quality Level = Percent Within Specification Limits
 $QL = (P_U + P_L) - 100$ = _____ + _____ - 100 = _____

Pay Factor = PF = _____ (From Table 113.1-2)
 Minimum Pay Factor = _____

Max Pay Factor = _____

Pay Adjustment Factor = PAF = _____
 = Min Pay Factor - 1.00 = _____ - 1.00 = _____

Section 9 - 8

Pay Factor Worksheet #7

Aggregate Specification: PMWC Test Value: #4

Test Results: n = 6
 Test Values: 25 51 34 57 29 42

Average Value: \bar{x} = _____ Standard Deviation: s = _____
 (σ_x)

Upper Specification Limit, SL_U = _____
 Lower Specification Limit, SL_L = _____

Upper Quality Index, $Q_U = \frac{SL_U - \bar{x}}{s}$ = _____ = _____

Percent Material Within SL_U , P_U = _____ (From Table 113.1-1)
 (If SL_U is not specified, $P_U = 100$)

Lower Quality Index, $Q_L = \frac{\bar{x} - SL_L}{s}$ = _____ = _____

Percent Material Within SL_L , P_L = _____ (From Table 113.1-1)
 (If SL_L is not specified, $P_L = 100$)

Quality Level = Percent Within Specification Limits
 $QL = (P_U + P_L) - 100$ = _____ + _____ - 100 = _____

Pay Factor = PF = _____ (From Table 113.1-2)
 Minimum Pay Factor = _____

Max Pay Factor = _____

Pay Adjustment Factor = PAF = _____
 = Min Pay Factor - 1.00 = _____ - 1.00 = _____

Section 9 - 9

Pay Factor Worksheet #8

Aggregate Specification: PMP (17) Test Value: #1
 Test Results: n = 5
 Test Values: 48 59 52 46 58
 Average Value: \bar{x} = Standard Deviation: s = (σ_u)
 Upper Specification Limit, SL_u =
 Lower Specification Limit, SL_L =
 Upper Quality Index, $Q_U = \frac{SL_u - \bar{x}}{s}$ =
 Percent Material Within SL_u , $P_U =$ (From Table 113.3-1)
 (If SL_u is not specified, $P_U = 100$)
 Lower Quality Index, $Q_L = \frac{\bar{x} - SL_L}{s}$ =
 Percent Material Within SL_L , $P_L =$ (From Table 113.3-1)
 (If SL_L is not specified, $P_L = 100$)
 Quality Level = Percent Within Specification Limits
 $QL = (P_U + P_L) - 100 =$ + $-100 =$
 Pay Factor = PF = (From Table 113.3-2)
 Max Pay Factor =
 Pay Adjustment Factor = PAF = Min Pay Factor - 1.00 = -1.00 =

Section 9 - 10

Pay Factor Worksheet

Aggregate Specification: _____ Test Value: _____
 Test Results: n = _____
 Test Values: _____
 Average Value: \bar{x} = Standard Deviation: s = (σ_u)
 Upper Specification Limit, SL_u =
 Lower Specification Limit, SL_L =
 Upper Quality Index, $Q_U = \frac{SL_u - \bar{x}}{s}$ =
 Percent Material Within SL_u , $P_U =$ (From Table 113.3-1)
 (If SL_u is not specified, $P_U = 100$)
 Lower Quality Index, $Q_L = \frac{\bar{x} - SL_L}{s}$ =
 Percent Material Within SL_L , $P_L =$ (From Table 113.3-1)
 (If SL_L is not specified, $P_L = 100$)
 Quality Level = Percent Within Specification Limits
 $QL = (P_U + P_L) - 100 =$ + $-100 =$
 Pay Factor = PF = (From Table 113.3-2)
 Max Pay Factor =
 Pay Adjustment Factor = PAF = Min Pay Factor - 1.00 = -1.00 =

Section 9 - 11

Atterberg Limits

TOTAL	WET WT (lb)								
FRACTURED FACES %	DRY WT (lb)								
FLAT & ELONGATED %	WET DRY + MOISTURE								
FINENESS MODULUS: see M.T.M. Sect. 602.2		% MOISTURE							
BLOWS = 25	Min. Pass	Dry + Pass	Temp =	Moisture =	Dry Res =	% MOISTURE			PLASTIC INDEX
	40	48	CC	AA, BB, CC	BB, CC, EF	(100 - EE) x 100			Pt-LL, Pt
LIQUID LIMIT (LL)	148.38	142.38	121.46						
PLASTIC LIMIT (PL)	141.21	138.74	123.57						

TOTAL	WET WT (lb)								
FRACTURED FACES %	DRY WT (lb)								
FLAT & ELONGATED %	WET DRY + MOISTURE								
FINENESS MODULUS: see M.T.M. Sect. 602.2		% MOISTURE							
BLOWS = 23	Min. Pass	Dry + Pass	Temp =	Moisture =	Dry Res =	% MOISTURE			PLASTIC INDEX
	40	48	CC	AA, BB, CC	BB, CC, EF	(100 - EE) x 100			Pt-LL, Pt
LIQUID LIMIT (LL)	160.34	154.21	122.62						
PLASTIC LIMIT (PL)	150.90	147.25	123.84						

Section 9 - 12

Atterberg Limits

TOTAL										WET WT (B)	
FRACTURED FACES %										DRY WT (B)	
FLAT & ELONGATED %										WET - DRY + MOISTURE	
FINENESS MODULUS: see M.T.M., Sect. 602 G:										% MOISTURE - MOISTURE DRY WT (A)(B)	
BLOWS =	No.	Wet Tare =	Dry Tare =	Tare =	MOISTURE =	Dry wt =	% MOISTURE		PLASTIC INDEX		
	No.	AA	BB	CC	AA, BB + CC	BB, CC + EE	(DD/EE) x 100	x Corr. Factor =	PI LL - PI		
LIQUID LIMIT (LL)	543	155.56	148.65	133.05							
PLASTIC LIMIT (PL)	8-3	140.16	137.88	124.75							

TOTAL										WET WT (B)	
FRACTURED FACES %										DRY WT (B)	
FLAT & ELONGATED %										WET - DRY + MOISTURE	
FINENESS MODULUS: see M.T.M., Sect. 602 G:										% MOISTURE - MOISTURE DRY WT (A)(B)	
BLOWS =	No.	Wet Tare =	Dry Tare =	Tare =	MOISTURE =	Dry wt =	% MOISTURE		PLASTIC INDEX		
	No.	AA	BB	CC	AA, BB + CC	BB, CC + EE	(DD/EE) x 100	x Corr. Factor =	PI LL - PI		
LIQUID LIMIT (LL)	A-2	181.08	162.76	122.62							
PLASTIC LIMIT (PL)	8-1	190.46	179.68	124.38							

Section 9 - 13
