

WHAT IS FLAT?

This can be a confusing question. Terms such as commercial flat, half-standard, flatness critical or panel flat are vague at best. Historically, flatness standards were found in ASTM specifications, which defines flatness as the maximum deviation from a horizontal surface, without regard to the peak-to-peak span of a wave. More exacting quantitative flatness measurements have been developed that define both height and span using various indices, the most common of which

is "I-Units." Leveltek believes I-Units provide the superior standard for determining flatness and has adopted the I-Units method of measurement. Depending on the width, thickness and incoming master coil shape, coils being processed through the Leveltek stretcher leveling line can be expected to be tremendously improved.

I-UNITS

I-Units are found by measuring the height of the off flat condition and the interval between each peak.
Find the I-Unit on the chart below.

Peak to Peak (in)	WAVE HEIGHT OF THE OFF FLAT CONDITION (INCHES) MEASURED WITH A STEP GAUGE													
	1/32	1/16	3/32	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
	0.031	0.063	0.094	0.125	0.188	0.250	0.313	0.375	0.438	0.500	0.625	0.750	0.875	1.000
5	9.6	38.5	86.7	154.1	346.6	616.2	962.9	1386.5	1887.2	2464.9	3851.4	5546.0	7548.8	9859.6
6	6.7	26.7	60.2	107.0	240.7	427.9	668.6	962.9	1310.5	1711.7	2674.6	3851.4	5242.2	6846.9
7	4.9	19.7	44.2	78.6	176.9	314.4	491.3	707.4	962.9	1257.6	1965.0	2829.6	3851.4	5030.4
8	3.8	15.0	33.9	60.2	135.4	240.7	376.1	541.6	737.2	962.9	1504.5	2166.4	2948.7	3851.4
9	3.0	11.9	26.7	47.5	107.0	190.2	297.2	427.9	582.5	760.8	1188.7	1711.7	2329.9	3043.1
10	2.4	9.6	21.7	38.5	86.7	154.1	240.7	346.6	471.8	616.2	962.9	1386.5	1887.2	2464.9
11	2.0	8.0	17.9	31.8	71.6	127.3	198.9	286.5	389.9	509.3	795.7	1145.9	1559.7	2037.1
12	1.7	6.7	15.0	26.7	60.2	107.0	167.2	240.7	327.6	427.9	668.6	962.9	1310.5	1711.7
13	1.4	5.7	12.8	22.8	51.3	91.2	142.4	205.1	279.2	364.6	569.7	820.4	1116.7	1458.5
14	1.2	4.9	11.1	19.7	44.2	78.6	122.8	176.9	240.7	314.4	491.3	707.4	962.9	1257.6
15	1.1	4.3	9.6	17.1	38.5	68.5	107.0	154.1	209.7	273.9	427.9	616.2	838.8	1095.5
16	0.9	3.8	8.5	15.0	33.9	60.2	94.0	135.4	184.3	240.7	376.1	541.6	737.2	962.9
17	0.8	3.3	7.5	13.3	30.0	53.3	83.3	119.9	163.3	213.2	333.2	479.8	653.0	852.9
18	0.7	3.0	6.7	11.9	26.7	47.5	74.3	107.0	145.6	190.2	297.2	427.9	582.5	760.8
19	0.7	2.7	6.0	10.7	24.0	42.7	66.7	96.0	130.7	170.7	266.7	384.1	522.8	682.8
20	0.6	2.4	5.4	9.6	21.7	38.5	60.2	86.7	117.9	154.1	240.7	346.6	471.8	616.2
21	0.5	2.2	4.9	8.7	19.7	34.9	54.6	78.6	107.0	139.7	218.3	314.4	427.9	558.9
22	0.5	2.0	4.5	8.0	17.9	31.8	49.7	71.6	97.5	127.3	198.9	286.5	389.9	509.3
23	0.5	1.8	4.1	7.3	16.4	29.1	45.5	65.5	89.2	116.5	182.0	262.1	356.7	466.0
24	0.4	1.7	3.8	6.7	15.0	26.7	41.8	60.2	81.9	107.0	167.2	240.7	327.6	427.9
28	0.3	1.2	2.8	4.9	11.1	19.7	30.7	44.2	60.2	78.6	122.8	176.9	240.7	314.4
32	0.2	0.9	2.1	3.8	8.5	15.0	23.5	33.9	46.1	60.2	94.0	135.4	184.3	240.7
36	0.2	0.7	1.7	3.0	6.7	11.9	18.6	26.7	36.4	47.5	74.3	107.0	145.6	190.2
40	0.2	0.6	1.4	2.4	5.4	9.6	15.0	21.7	29.5	38.5	60.2	86.7	117.9	154.1
44	0.1	0.5	1.1	2.0	4.5	8.0	12.4	17.9	24.4	31.8	49.7	71.6	97.5	127.3
48	0.1	0.4	0.9	1.7	3.8	6.7	10.4	15.0	20.5	26.7	41.8	60.2	81.9	107.0
54	0.1	0.3	0.7	1.3	3.0	5.3	8.3	11.9	16.2	21.1	33.0	47.5	64.7	84.5
60	0.1	0.3	0.6	1.1	2.4	4.3	6.7	9.6	13.1	17.1	26.7	38.5	52.4	68.5
66	0.1	0.2	0.5	0.9	2.0	3.5	5.5	8.0	10.8	14.1	22.1	31.8	43.3	56.6
72	0.0	0.2	0.4	0.7	1.7	3.0	4.6	6.7	9.1	11.9	18.6	26.7	36.4	47.5
78	0.0	0.2	0.4	0.6	1.4	2.5	4.0	5.7	7.8	10.1	15.8	22.8	31.0	40.5
84	0.0	0.1	0.3	0.5	1.2	2.2	3.4	4.9	6.7	8.7	13.6	19.7	26.7	34.9

Stretcher Level 5 I-Units or less
 Flatness Critical 20 I-Units or less
 Commercial Flatness 42 I-Units or less
 Out of Tolerance 42 I-Units or more