

# Tolerance Stacks Using GD&T

## Exercise Answer Guide

### Unit 2

Ex. 2-1

1. 10.4
2. 10.38
3. 10.5
4. 10.5
5. 0.02
6. -0.1
7. -0.1

### Unit 3

Ex. 3-1

1. calculation, maximum, minimum
2. dimensional relationship, establish, compare
3. complete drawings, well designed, change requests, product costs
4. design
5. linear, radial

<b>Unit 4</b>	<b>Max</b>	<b>Min</b>	<b>Unit 5</b>	<b>Max</b>	<b>Min</b>
Ex. 4-1	2.6	0.6	Ex. 5-1	0.78	
Ex. 4-2	2.4	0.4	Ex. 5-2	17.0	
Ex. 4-3	5.3	3.8	Ex. 5-3		12.4
Ex. 4-4	4.05	2.95	Ex. 5-4	2.6	
Ex. 4-5	2.8	0.2	Ex. 5-5		1.18
Ex. 4-6	4.5	1.9	Ex. 5-6		-0.52
<b>Unit 6</b>	<b>Max</b>	<b>Min</b>	<b>Unit 7</b>	<b>Max</b>	<b>Min</b>
Ex. 6-1	0.6	0.425	Ex. 7-1	3.35	
Ex. 6-2	3.1	2.9	Ex. 7-2	13.43	
Ex. 6-3	3.11	2.92	Ex. 7-3		-0.035
Ex. 6-4	3.55	3.35	Ex. 7-4	2.3	
Ex. 6-5	2.7	0.8	Ex. 7-5		0.3
Ex. 6-6	2.7	0.0	Ex. 7-6	3.4	
Ex. 6-7	2.5	0.0			
<b>Unit 8</b>	<b>Max</b>	<b>Min</b>	<b>Unit 9</b>	<b>Max</b>	<b>Min</b>
Ex. 8-1	160.8	159.2	Ex. 9-1		-0.1
Ex. 8-2	142.4	141.4	Ex. 9-2	8.4	
Ex. 8-3	7.7	6.3	Ex. 9-3		6.4
Ex. 8-4	6.7	5.3	Ex. 9-4	4.0	0.0
Ex. 8-5	8.4	7.6	Ex. 9-5	1.9	0.1
Ex. 8-6	6.8	5.2	Ex. 9-6	0.5	-0.5
			Ex. 9-7	6.5	

<b>Unit 10</b>	<b>Max</b>	<b>Min</b>	<b>Unit 11</b>	<b>Max</b>	<b>Min</b>
Ex. 10-1	20.05	19.65	Ex. 11-1	20.05	19.35
Ex. 10-2	2.26	1.3	Ex. 11-2	10.05	9.55
Ex. 10-3	2.2	0.24	Ex. 11-3	1.4	0.2
Ex. 10-4	0.25	-0.25	Ex. 11-4	2.0	0.6

<b>Unit 12</b>	<b>Max</b>	<b>Min</b>	<b>Unit 13</b>	<b>Max</b>	<b>Min</b>
Ex. 12-1	44.675	44.415	Ex. 13-1	2.85	
Ex. 12-2	13.85	12.65	Ex. 13-2	5.095	
Ex. 12-3	2.535	2.225	Ex. 13-3		4.155
Ex. 12-4	10.88	10.32	Ex. 13-4		0.05
Ex. 12-5	18.36	16.96			
Ex. 12-6		0.55			
Ex. 12-7	6.26	5.26			
Ex. 12-8	49.5	44.9			

<b>Unit 14</b>	<b>Max</b>	<b>Min</b>	<b>Unit 15</b>	<b>Max</b>	<b>Min</b>
Ex. 14-1	0.18		Ex. 15-1	3.3	
Ex. 14-2	0.4		Ex. 15-2		4.1
Ex. 14-3		1.4			
Ex. 14-4		13.4			

<b>Unit 16</b>	<b>Max</b>	<b>Min</b>	<b>Unit 17</b>	<b>Max</b>	<b>Min</b>
Ex. 16-1	15.9	15.5	Ex. 17-1	0.4	-0.05
Ex. 16-2	0.06		Ex. 17-2		0.05

<b>Unit 18</b>	<b>Max</b>	<b>Min</b>	<b>Unit 19</b>	<b>Max</b>	<b>Min</b>
Ex. 18-1	5.15	3.25	Ex. 19-1	2.4	1.64
Ex. 18-2	52.7	52.24	Ex. 19-2	3.205	
Ex. 18-3	1.54	0.41	Ex. 19-3		5.5
Ex. 18-4	159.15	157.75	Ex. 19-4		0.7
Ex. 18-5	44.405	43.795	Ex. 19-5	9.1	
Ex. 18-6	6.725	6.025	Ex. 19-6	174.3075	
Ex. 18-7		2.92	Ex. 19-7		-0.85
Ex. 18-8	20.50	18.57			

**Unit 20**

Ex. 20-1

4-4, 5-3, 5-4, 5-6

Ex. 20-2

Yes, 9.1 max seems reasonable

Yes, the flatness tolerance on the cover (X-102) is not going to occur only around the shaft area in both directions. Subtract the 0.1 flatness from stack min. subtotal.