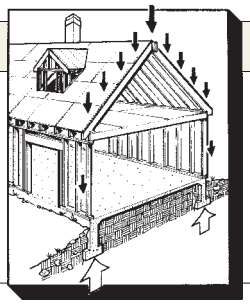
Reroofing Over Asphalt Shingles



by Robert Randall, P.E.

Sooner or later, every remodeler will be asked to reroof over an existing asphalt shingle roof. But before adding a third, or even a second, layer of 300-pound-per-square shingles, you have to make sure the roof structure can handle the load. The chart presented here (facing page) is designed to help you do just that. The top section of the chart applies to situations where you are adding a second layer of shingles; the bottom section is for three layers (in those cases where code allows — and the customer insists).

You may be surprised when you use the chart, because many older buildings were never built to comply with building code guidelines in the first place. That's why many towns and most states prohibit more than two layers of roofing. Many older roofs were inadequately framed at the time they were built and may already exceed these spans. *Do not* add layers of roofing to such structures.

Also, in some cases, eaves ties (attic floor joists) and collar ties may not be adequately fastened and the weight of additional roofing could cause connections to slip and the roof to sag.

Using the Chart

To use the chart, go down the left hand column to the correct row for the rafter size and code snow load for your area. Move across the chart to the correct rafter spacing and lumber grade to find the maximum length that the rafters can span. The chart is based on Douglas fir grades 1, 2, and 3. In cases where no grade stamp is available, use the "U" column for unknown species.

Note that span is always measured horizontally, not on the slope. Note also that this chart is not generally applicable to cathedral ceilings, which are typically designed for deflection of L/360 as compared with the L/240 criterion here. In other words, the roof structure would need to be 50% stiffer than the chart says when a finished ceiling is attached.

When rafter spans preclude recovering, in some cases an easy remedy may be to install struts to reduce the effective rafter spans and transfer part of the roof load to the structure below. In many cases, struts may prove impractical or impossible, but in some cases they may work. Strut design is best left to an engineer; if you do it wrong, you can easily cause sagging ceilings and cracked drywall or worse in the interior below.

Better to Strip Before Reroofing

Perhaps my chart will be useful as a tool to justify to the homeowner the added expense of stripping before reshingling, which always results in a superior job. Another recommendation is to develop written specifications that can be used to sell the customer on quality features. For example:

- Strip all existing roofing
- Replace any deteriorated wood roof decking
- Install drip-edge at all sides, including rakes
- Install Ice & Water Shield at eaves and valleys
- Install step flashings and Ice & Water Shield at junction of roof and higher walls
- Install crickets where needed
- Rework chimney step and counter flashing as necessary
- Install ridge and soffit vents where needed

You might also offer a warranty on work where these features are included, not applicable to "cheap jobs" where the customer insists on the lowest price.

In the long run, the successful contractor is the one who insists on doing nothing but quality work and knows when to turn away a prospective customer rather than embark on a questionable job. ■

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Maximum Rafter Span (inches) for Multiple Layers of Asphalt Shingles

Two layers of shingles

Rafter Spacing		16" o.c.				24" o.c.				32" o.c.				48" o.c.			
Lumber Grade		#1	#2	#3	U	#1	#2	#3	U	#1	#2	#3	U	#1	#2	#3	U
Size	Live Load																
2x4	10 lb.	[126]	[123]	99	85	[110]	[107]	82	70	98	93	71	61	80	77	58	50
	20 lb.	[100]	[97]	80	68	[87]	[85]	65	56	78	75	57	49	64	61	47	40
	30 lb.	[87]	[85]	69	59	[76]	74	56	48	67	64	49	42	55	53	40	34
	40 lb.	[79]	[77]	61	52	69	66	50	43	60	57	43	37	49	47	35	30
	50 lb.	[74]	[72]	56	48	63	60	46	39	54	52	39	34	44	43	32	28
2x6	10 lb.	197	188	143	123	163	156	118	101	142	136	103	88	117	112	85	73
	20 lb.	[157]	152	116	99	131	125	95	82	114	109	83	71	93	89	68	58
	30 lb.	137	131	100	86	113	108	82	70	98	94	71	61	80	77	58	50
	40 lb.	122	117	89	76	100	96	73	63	87	83	63	54	71	68	52	44
	50 lb.	111	107	81	70	91	88	66	57	79	76	58	49	65	62	47	40
2x8	10 lb.	246	236	179	153	204	196	148	127	178	171	130	111	147	141	107	92
	20 lb.	200	191	145	125	165	158	120	103	144	138	104	90	118	113	86	74
	30 lb.	173	165	125	108	142	136	103	89	124	118	90	77	101	97	74	63
	40 lb.	154	148	112	96	127	121	92	79	110	105	80	69	90	86	66	56
	50 lb.	141	135	102	88	115	111	84	72	100	96	73	63	82	79	60	51
2x10	10 lb.	296	284	215	185	247	237	180	154	216	207	157	135	179	171	130	111
	20 lb.	242	232	176	151	200	192	146	125	175	167	127	109	144	138	104	90
	30 lb.	209	201	152	131	173	165	126	108	150	144	109	94	124	118	90	77
	40 lb.	187	179	136	117	154	148	112	96	134	128	97	84	110	105	80	69
	50 lb.	171	164	124	107	141	135	102	88	122	117	89	76	100	96	73	62
2x12	10 lb.	339	325	246	212	284	272	206	177	249	239	181	155	206	197	150	129
	20 lb.	278	266	202	173	231	221	168	144	202	193	146	126	166	159	121	104
	30 lb.	241	231	175	150	200	191	145	124	174	166	126	108	143	137	104	89
	40 lb.	216	207	157	135	178	171	129	111	155	149	113	97	127	122	92	79
	50 lb.	197	189	143	123	163	156	118	101	141	135	103	88	116	111	84	72

Three layers of shingles

2x4	10 lb.	[126]	121	92	79	104	100	76	65	90	87	66	56	74	71	54	46
	20 lb.	[100]	[97]	76	65	86	82	62	53	74	71	54	46	61	58	44	38
	30 lb.	[87]	[85]	66	57	75	71	54	46	65	62	47	40	53	51	38	33
	40 lb.	[79]	[77]	59	51	67	64	49	42	58	55	42	36	47	45	34	30
	50 lb.	[74]	71	54	47	61	59	44	38	53	51	38	33	43	41	31	27
2x6	10 lb.	183	175	133	114	151	144	110	94	131	126	95	82	108	103	78	67
	20 lb.	151	145	110	94	125	119	91	78	108	104	79	68	89	85	64	55
	30 lb.	132	127	96	82	109	104	79	68	94	90	68	59	77	74	56	48
	40 lb.	119	114	86	74	97	93	71	61	85	81	61	53	69	66	50	43
	50 lb.	109	104	79	68	89	85	65	56	77	74	56	48	63	61	46	39
2x8	10 lb.	229	219	166	143	190	182	138	118	165	158	120	103	136	130	99	85
	20 lb.	190	182	138	119	157	150	114	98	137	131	99	85	112	107	81	70
	30 lb.	166	159	121	104	137	131	99	85	119	114	86	74	98	93	71	61
	40 lb.	150	143	109	93	123	118	89	77	107	102	78	67	88	84	64	55
	50 lb.	137	131	100	86	113	108	82	70	98	94	71	61	80	77	58	50
2x10	10 lb.	276	265	201	172	230	220	167	143	201	192	146	125	166	159	120	103
	20 lb.	231	221	168	144	191	183	139	119	166	159	121	104	137	131	99	85
	30 lb.	202	193	147	126	167	159	121	104	145	139	105	90	119	114	86	74
	40 lb.	182	174	132	113	150	143	109	93	130	125	95	81	107	102	78	67
	50 lb.	167	160	121	104	137	131	100	86	119	114	87	74	98	93	71	61
2x12	10 lb.	317	303	230	198	264	253	192	165	232	222	168	144	191	183	139	119
	20 lb.	265	254	193	165	220	211	160	137	192	184	139	120	158	151	115	99
	30 lb.	233	223	169	145	192	184	140	120	168	160	122	104	138	132	100	86
	40 lb.	210	201	153	131	173	166	126	108	151	144	109	94	124	118	90	77
	50 lb.	193	185	140	120	159	152	115	99	138	132	100	86	113	108	82	71

Notes: Chart assumes asphalt shingles @ 3 psf per layer, plywood @ 1.5 psf, L/240 deflection.
Rafter spans in brackets [ ] are controlled by deflection.