

GCP Applied Technologies' Design Flowchart ^(a) Floor Designs - Restrained

		Load Restricted			Non-load Restricted (b)				
		Assembly	Beam	Joist	Assembly	Beam	Joist		
Metal Floor Deck with Concrete	Fluted/ Cellular Deck	Unprotected Deck (Conc. Deck Thickness Footnote c)	Fluted/Cellular ^(e)	D925	N708	N777	D925 ^(d)	N852	N854
			All Fluted	D925	N782 ^(f)	N854	D985	N852	N854
		Protected Deck Min. 2 1/2" LWC/NWC ^(g)	Fluted/Cellular ^(e)	D739	N706	N777	D739 ^(d)	N852	N854
			All Fluted (LWC & NWC)	D779	N782 ^(f)	N854	D798	N852	N854
		Protected Deck Min. 2" LWC/NWC ^(g)	Fluted/Cellular 1hr & 1 1/2hr ^(e)	D743			D743 ^(d)		
			Fluted/Cellular 2hr & 3hr ^(e)	D743			D743 ^(d)		
			All Fluted 1hr & 1 1/2hr	D743	S750	S728	D743 ^(d)	S750	S749
			All Fluted 2hr & 3hr	D743	S734	S728	D743 ^(d)	S750	S749
		Protected Deck Min. 3 1/4" LWC ^(g)	All Fluted (LWC)	D782	N782	N854	D782 ^(d)	N852	N854
		Corrugated Deck	Protected Deck (Min. 2 1/2" LWC/NWC)	D780	N779		D780 ^(d)	S750	S749
		Unprotected Deck (LWC & NWC)	D925	N782		D925 ^(d)	S750	S749	
Concrete Slab	Poured In Place	NWC	Unprotected & Protected Slab (Min. 2 1/2")	J712	N782	N854	J712 ^(d)	N852	N854
		LWC	Unprotected & Protected Slab (Min. 2 1/2")	J709	N782	N854	J709 ^(d)	N852	N854
	Precast Hollowcore	Unprotected Slab (LWC & NWC) ^(h)	J957			J957 ^(d)			

Footnotes

- a) The UL designs listed in this guide are the most efficient thicknesses at time of printing for the most common construction assemblies, but may not cover all scenarios. Please consult your local GCP Applied Technologies' representative for updates and consult the UL Directory for further limitations and information.
- b) On December 31, 2015, UL issued a document entitled "Updates to Load Restriction Factors". In this document, UL states that load restriction factors only applies to restrained steel beam ratings greater than 1-hour. Non-load restricted UL listing will contain the following information below the Design number on the listing: "Loading Determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit State Design provisions of Part 4 of the National Building Code of Canada."
- c) Unprotected concrete deck thicknesses from D985:

Restrained Assembly Rating Hr **	Normal Weight Concrete		Restrained Assembly Rating Hr **	Lightweight Concrete	
	Concrete Unit Weight pcf	Concrete Thkns In.		Concrete Unit Weight pcf	Concrete Thkns In.
1 hr	147-153	3 1/2	3/4 hr or 1 hr	107-113	2 1/2
1-1/2 hr	147-153	4	1 hr	107-120	2 5/8
2 hr	147-153	4 1/2	1-1/2 hr	107-113	3
3 hr	147-153	5 1/4	2 hr	107-113	3 1/4
			2 hr	107-116	3 1/4 *
			2 hr	114-120	3 1/2
			3 hr	107-113	4 3/16
			3 hr	114-120	4 7/16

* - For use with 2 or 3 in. steel floor and form units only.
 ** - Unrestrained ratings are subject to deck gauge and span limitations.

- d) UL substitution rules allow for the substitution on non-load restricted beam and joist designs into floor and roof assemblies that were tested using WSD. Due to the fact that roof decks and floor decks do not have load restriction factors in UL's Load Restriction Factor tables, the assemblies will be non-load restricted as long as all beam and joist thicknesses are based on non-load restricted UL Designs.
- e) Spatterkote® SK-3 is required on all cellular units with flat plate on the bottom.
- f) Thicknesses for Z106 HY may have an advantage over MK-6/HY for 2hr and 3hr ratings with LW concrete.
- g) For decks painted with unclassified paint/primer, lath requirements must be determined.
- h) For unprotected deck applications, the thickness of the fire-protection material required on the deck within 12 in. beyond the edges of the structural beam or joist should be equal to the beam or joist protection thickness.

The information contained in this flowchart is provided for the convenience of our Monokote customers and while we have taken care to be as accurate and update possible, GCP Applied Technologies' will not be held responsible for errors or inaccuracies. In case of discrepancy, all substitutions must comply with the guidelines as outlined in Underwriters Laboratories Fire Resistance Directory.

GCP Applied Technologies' Design Flowchart ⁽ⁱ⁾

Roof Designs - Restrained

		Load Restricted			Non-load Restricted (j)				
		Assembly	Beam	Joist	Assembly	Beam	Joist		
Roofs	Metal Roof Deck with Insulation	Protected Roof/Ceiling (l)							
		Polystyrene Board (IRMA)		P714	S750	S728	P714 ^(k)	S750	S749
		Polystyrene Board over GWB		P725	S750	S728	P753	S750	S749
		Polyisocyanurate Board ^{(m) (n)}		P732	S750	S728 ^(o)	P753	S750	S749
		Sprayed Polyurethane Foam		P733	S750	S728	P733 ^(k)	S750	S749
	Unprotected Roof/Ceiling								
	Mineral and Fiber Board ^{(m) (n)}		P732	S750	S728 ^(o)	P753	S750	S749	
	Metal Roof Deck with Insulating Concrete								
	Insulating Concrete		P936	S735	S736	P936	S750	S749	

Columns ^(p)

		Column	
Column	Wide Flange	Standard & Medium Density (MK-6, RG, MK-1000/HB, MK-10/HB, Z-106/HY, Z-106G)	X854
		High Density (Z-146, Z-156, Z-146T, Z-156T)	X854 or X795 (Check Design)
	Tube & Pipe	Standard & Medium Density (MK-6, RG, MK-1000/HB, MK-10/HB, Z-106/HY, Z-106G)	Y710
		High Density (Z-146, Z-156, Z-146T, Z-156T)	X795

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- j) On December 31, 2015, UL issued a document entitled "Updates to Load Restriction Factors". In this document, UL states that load restriction factors only applies to restrained steel beam ratings greater than 1-hour. Non-load restricted UL listing will contain the following information below the Design number on the listing: "Loading Determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit State Design provisions of Part 4 of the National Building Code of Canada."
- k) UL substitution rules allow for the substitution on non-load restricted beam and joist designs into floor and roof assemblies that were tested using WSD. Due to the fact that roof decks and floor decks do not have load restriction factors in UL's Load Restriction Factor tables, the assemblies will be non-load restricted as long as all beam and joist thicknesses are based on non-load restricted UL Designs.
- l) For decks painted with unclassified paint/primer, lath requirements must be determined.
- m) Spatterkote® SK-3 is required on decking with gypsum products.
- n) MK-6/GF and Z106 HY may have an advantage over MK-6/HY with joists supporting protected roof decks (S728).
- o) P732 unrestrained thicknesses may have an advantage over S728 for 16K roof joists.
- p) Per UL BXUV, "unless otherwise specified in the individual designs, columns do not have a Load Restriction Factor, as those ratings are based on temperature limitations in accordance with ANSI/UL 263."

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