

## GCP Applied Technologies' Design Flowchart <sup>(a)</sup> Floor Designs - Unrestrained

		Assembly	Substitutions		Non-Load Restricted <sup>(b)</sup>		
			Beam	Joist	Joist		
Metal Floor Deck with Concrete	Fluted/ Cellular Deck	Unprotected Deck (Concrete Deck Thicknesses Footnote c)	Fluted/Cellular <sup>(e)</sup>	D925	N708	N777	N854
		All Fluted LWC	D925	N782 <sup>(e)</sup>	N854	N854	
		All Fluted (1hr to 2hr NWC)	D925	N852	N854	N854	
		All Fluted (3hr to 4hr NWC)	D925	N782 <sup>(e)</sup>	N854	N854	
	Protected Deck Min. 2 1/2" LWC/NWC <sup>(f)</sup>	Fluted/Cellular <sup>(d)</sup>	D739	N706	N777	S749	
		All Fluted LWC	D779	N782 <sup>(e)</sup>	N854	N854	
		All Fluted (1hr to 2hr NWC)	D779	N852	N854	N854	
	Protected Deck Min. 2" <sup>(f)</sup> LWC/NWC	Fluted/Cellular <sup>(d)</sup>	D743				
		All Fluted	D743		S728	S749	
	Protected Deck Min. 3 1/4" LWC <sup>(f)</sup>	All Fluted (LWC)	D782	N782 <sup>(e)</sup>	N854	N854	
Corrugated Deck	Protected Deck (Min. 2 1/2" LWC/NWC)	D780	N782 <sup>(e)</sup>	S728	S749		
	Unprotected Deck (LWC & NWC)	D925	N782 <sup>(e)</sup>	S728	S749		
Concrete Slab	Poured In Place	Unprotected & Protected Slab (Min. 2 1/2") (1hr & 2hr)	J712	N852	N854	N854	
		NWC					
	Unprotected & Protected Slab (Min. 2 1/2") (3hr & 4hr)	J712	N782 <sup>(e)</sup>	N854	N854		
	LWC	Unprotected & Protected Slab (Min. 2 1/2")	J709	N782 <sup>(e)</sup>	N854	N854	
Precast Hollowcore	Unprotected Slab (LWC & NWC) <sup>(g)</sup>	J957					

### 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 addressed load restriction factors for steel beam ratings only. Load restrictions related to joists were not evaluated and therefore, load restrictions on joists for unrestrained assemblies need to be considered. 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 D925:

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) Spatterkote® SK-3 is required on all cellular units with flat plate on the bottom.

e) Thicknesses for Z106 HY may have an advantage over MK-6/HY.

f) For decks painted with unclassified paint/primer, lath requirements must be determined.

g) Depending on the hollowcore construction, it may be possible to substitute the Beam Design N782 and/or the Joist Design N854 into UL Design J957. A calculation of the concrete volume per unit floor area and the density of the concrete of the hollowcore unit would need to be greater than or equal to the values contained in N782 and/or N854.

**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 <sup>(h)</sup>

### Roof Designs - Unrestrained

Roofs	Assembly	Substitutions		Non-Load Restricted <sup>(i)</sup>		
		Beam	Joist	Joist		
		Assembly	Beam	Joist	Joist	
Metal Roof Deck with Insulation	Polystyrene Board (IRMA)	P714	S750	S728	S749	
	Polystyrene Board over GWB (1hr)	P725	S750	S728	S749	
	Polystyrene Board over GWB (> 1hr)	P725		S728	S749	
	Protected Roof/Ceiling <sup>(j)</sup>	Polyisocyanurate Board (1hr) <sup>(k) (l) (m)</sup>	P732	S750		S749
		Polyisocyanurate Board (> 1hr) <sup>(k) (l) (m)</sup>	P732			S749
	Metal Roof Deck with Insulating Concrete	Sprayed Polyurethane Foam	P733	S750	S728	S749
		Mineral and Fiber Board (1hr) <sup>(k) (l) (m)</sup>	P732	S750		S749
		Mineral and Fiber Board (> 1hr) <sup>(k) (l) (m)</sup>	P732			S749
		Unprotected Roof/Ceiling				
		Insulating Concrete	P936	S735	S736	S749

### Columns

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

#### Footnotes

- h) 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.
- i) On December 31, 2015, UL issued a document entitled "Updates to Load Restriction Factors". In this document, UL addressed load restriction factors for steel beam ratings only. Load restrictions related to joists were not evaluated and therefore, load restrictions on joists for unrestrained assemblies need to be considered. 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."
- j) For decks painted with unclassified paint/primer, lath requirements must be determined.
- k) Spatterkote® SK-3 is required on decking with gypsum products.
- l) For 2hr ratings, S728 may provide more competitive thicknesses.
- m) MK-6/GF and Z106 HY may have an advantage over MK-6/HY with joists supporting protected roof decks (S728).

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