

**U-LI™** Metal Framing System

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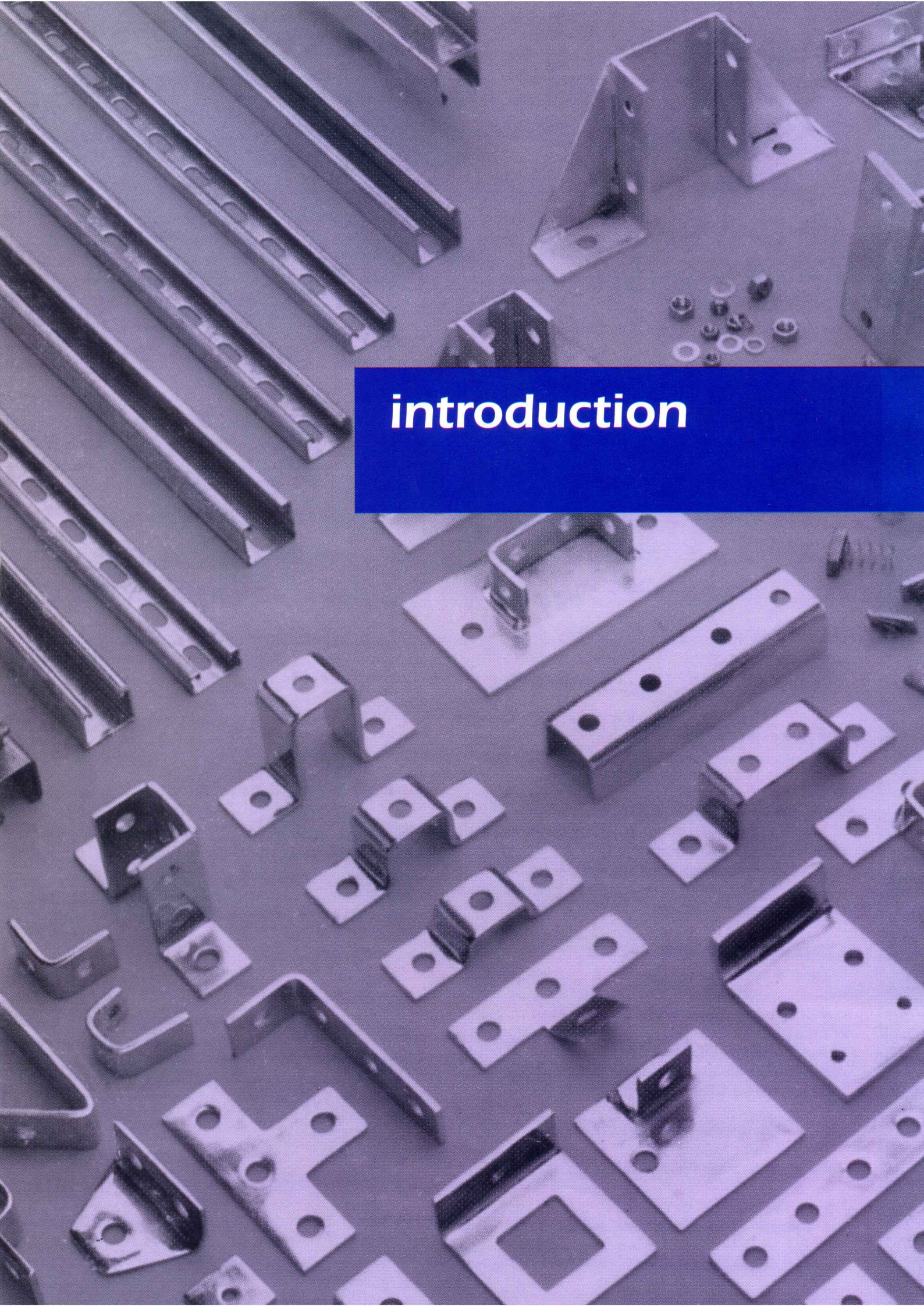
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**introduction**

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## Company Background

Since its modest beginning in 1978, United U-LI Corporation has developed into a prominent and respected supplier of cable management and structural support systems in the ASEAN region.

The company initially engaged in engineering works and the trading of cable support systems and began the manufacturing of cable support systems on a modest scale.

Over the years, the company has grown tremendously and has equipped the 3-acre factory with state-of-the-art machinery, for the purpose of providing guaranteed internationally approved products to customers.

In April 2002, the company was listed in the Kuala Lumpur Stock Exchange, being the first company in the cable management industry in Malaysia to do so. The company will now have better financial strength and commitment to enhance the quality of its service and products for customers.

## Materials

### General

U-LI's standard UliStrut ® range of metal framing products are manufactured from low carbon steel. Carbon steels provide the backbone of the engineering industry and their low initial cost compared with alternative materials contribute to their popularity.

### Channels and combinations

UliStrut ® metal framing channels are produced by multiple sets of forming rolls which accurately cold-form strip steel into the required channel configuration. This process produces uniformed channel sections with dimensions and tolerances in accordance with BS6946:1988 "Metal channel cable support systems for electrical installations".

UliStrut ® metal framing channels are manufactured from steel with a guaranteed minimum Yield Stress of 250N/mm<sup>2</sup> and comply with BS1449 Part 1:1983.

The continuous slot with returned lips on one side of the channel enables the securing of attachments (fittings) at any point along the length of the channel. These combination channels are joined

through staggered welding.

### General fittings

UliStrut ® fittings and cantilever brackets comply with BS1449 Part1:1983 or BS4360:1972 and are manufactured from hot-rolled, pickled and oiled steel plates, strip or coil. They have a guaranteed minimum yield stress of 170N/mm<sup>2</sup> as specified in BS6946:1988.

### Fasteners

UliStrut ® spring nuts are manufactured from mild steel bars. The end product is a nut with two grooves, each possessing sharp teeth. The sharp teeth provide grip by biting into the return lips of the UliStrut ® channel giving it greater resistance to slip and pull-out.

## General

Carbon steels are the most commonly used materials for engineering structures because they combine great strength with good economy. Following are the various finishes available for ULI products manufactured from carbon steel, shown in the order of most corrosion resistant to the least.

## ULI Duplex System

"A cost effective alternative to stainless steel for cable support systems"

ULI Duplex consists of Hot-dip galvanized mild steel which is protected by a cross-polymer coating. The polymer is applied in the form of a powder coating through electrostatic spray to ensure an even film build up and good coverage on edges. ULI Duplex is a cost effective alternative to stainless steel and has greater resistance in corrosive environments especially where chlorides are present.

ULI Duplex capitalizes on the synergy between hot-dip galvanizing and powder coating. The results are long-term protection of capital assets under harsh marine and chemically aggressive environments.

## How the ULI Duplex System Functions

Mild Steel applied with Zinc galvanizing counteracts corrosion through cathodic protection. The zinc plays the role of the sacrificial cathode which prevents the substrate from being corroded and is thus gradually consumed. Subsequently, an organic coating is applied over the zinc layer in order to extend the life-span of the zinc. This organic coating protects the zinc from attack by corrosive chemicals, giving them a greater life expectancy to the system. However, if the organic coating has imperfections (e.g. through mechanical damage), oxides will be formed by the zinc to seal the crevices thus arresting the advancement of corrosion.

The final colour and gloss requirements (e.g. semi-matt black) is achieved through powder coating. Also, the use of polyester in the specified colour creates maximum resistance to degradation by ultra-violet rays. The specially formulated polyester has the required flow properties to form a continuous layer which is impervious to moisture.

Polyester powder coatings are thermally cross-linked to form a tough and resilient protective film with a high degree of mar-resistance. Therefore, there is no threat of the film losing mechanical properties on exposure to elevated temperatures.

In the event of a fire, there is no threat of running or dripping as in the case with thermoplastic coatings. The combined zinc and polymer film build creates the desired protective properties without an excessively high loading of organic substance.

ULI Duplex does not promote combustion. Therefore, on exposure to high temperature conditions, there is no liberation of halogens.

For further details on the features, performance and benefits of the ULI Duplex system, a comprehensive brochure is available upon request.

## Hot-dip Galvanizing (HDG)

Hot-dip galvanizing is a process where completely manufactured or roll-formed steel is chemically cleaned of all contaminants and then dipped in molten zinc. This will allow a coating consisting of iron / zinc-alloys which are usually over-coated with a layer of relatively pure zinc.

All hot-dip galvanizing is applied in accordance with ASTM A123:1989 / EN ISO 1461:1999(E) which supersedes BS729:1971. The zinc coating thickness varies from 45µm (up to 2mm thick material for bolts and nuts) to 55µm (for at least 5mm thick material).

## Sheet Galvanizing (Pre-galvanized) (PG)

Sheet metal (steel strip) is hot-dip galvanized in a continuous process which yields an even zinc coated sheet with a bright smooth metallic finish. Materials such as steel is galvanized prior to the manufacturing (roll-forming or press operations) of channels or fittings. All "pre-galvanized" steel used is in accordance with BS2989:1982 and usually grade Z275.

## Powder Coating on Plain Steel (Mill Finish)

ULIStrut® channels, channel combinations, general fittings, cantilever brackets and most clamps are supplied on plain steel substrate with either a epoxy polyester or pure polyester powder coating finish. All powder coating meet with the highest international quality standards and manufacturer recommended coating thicknesses.

## Electro-galvanizing (EG)

All zinc electroplating with passivation is in accordance to BS7371 Part 1:1991 for threaded mild steel products up to 19mm in diameter and to BS1706:1960 for other mild steel products.

## Plain (Mill Finish) Steel (PL)

ULIStrut® channels and fittings are untreated and retain an oiled surface from the rolling or pressing process. Alternative steel grades and surface finishes are available upon request, but may be subject to minimum order quantities.

# Design Fundamentals

## Channel Loading Data - Mild Steel

All load data for **U-LI** mild steel channels in this catalogue are calculated in accordance with :-

BS55950 Part 5:1987 - Code of Practice for Design of Cold-formed Sections.

## Beams

There are two main criteria which control the recommended working load when used as beams. The first being the stress-cum-stability criteria and the other being serviceability i.e. deflection.

All UliStrut mild steel channels have a guaranteed minimum Yield Stress of 250Mpa. The maximum allowable deflection according to SABS0162 Part 2:1993 is span/200 which also contributes towards aesthetical appeal.

All beam loads indicated load perpendicular to the X-X axis.

## Columns

There is one criteria which controls the recommended working load when used as a column - the criteria being stress-cum-stability. The material used, slenderness and end connection conditions determine the safe working load for columns.

As mentioned above, all UliStrut® mild steel channels have a guaranteed minimum Yield Stress of 250Mpa. The slenderness of the column is related to the ratio of the effective length to the applicable (lesser) radius of gyration -  $KL/r$ .

As for the end connection conditions determine the effective length factor K, **U-LI** strongly recommends that the engineer perform a detailed study of the end connection before the selection of K Factor.

## Loading

Loading to the beam can either be applied as a Uniformly Distributed Load (UDL) over the span of the beam or as a concentrated point load applied at the center of the span.

The tables indicate the recommended safe working load in kilogrammes (kg) applied as a UDL or point load.

Beam loads and corresponding deflection for all UliStrut® channels are calculated using the factor of safety  $SF=1.6$ .

## Catalogue Illustrations

The illustrations in this catalogue are not necessarily to scale. All dimensions are in millimetres (mm).

## Product Tolerance Specifications

All products in this catalogue conform to the **U-LI** product tolerance specifications. Should there be a requirement for more stringent tolerances, they are to be stipulated during enquiry. Such requirements will have added cost implications.

## Weights

All weights are merely approximations for calculating shipping (transport) weights.

The image displays a wide variety of metal hardware components, primarily in a golden-brown or brass finish. On the left side, several long, U-shaped channels are arranged in a parallel, slightly overlapping fashion. To the right and scattered throughout the lower half of the image are numerous smaller parts, including L-shaped brackets, flat plates with pre-drilled holes, and various fasteners like nuts and washers. The components are set against a dark, textured background, which makes the metallic surfaces stand out. A prominent red rectangular box is overlaid on the right side of the image, containing the text 'channels and combinations' in a clean, white, sans-serif font.

**channels and  
combinations**

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## Material

UliStrut® single channels are accurately cold roll-formed from mild steel complying with BS1449 Part 1:1983 in accordance with the BS6946:1988 with a guaranteed minimum Yield Stress of 250N/mm<sup>2</sup>.

UliStrut® channels are also available in stainless steel grade 316 in accordance with BS1449 Part 2:1983. According to requirement, UliStrut® channels can also be supplied in other grades of stainless steel, aluminum alloys and glass reinforced polyester (GRP).

## Welding

Combination channels are manufactured (joined) by staggered welding. Welds are spaced to meet the loadings specified in this section. Other combination channels are available upon request.

## Finishes

The standard finish is hot-dip galvanized to ASTM A123:1989 / EN ISO 1461:1999(E) which supersedes BS729:1971. Other finishes are available upon request.

## Standard lengths

Stocked lengths are 6.0 metres with a tolerance of  $\pm 6$ mm. Other lengths are available upon request.

## Dimensions

All dimensions used in this section are in millimeters (mm) unless otherwise stated.

## Performance

All load data for beams and columns in this section pertain to carbon steel and stainless steel. Load tables are constructed in accordance with the principles of analysis covered by BS5950 Part 5:1987 and BS6946:1988.

All beam loads indicated load perpendicular to the X-X axis and include channel weight. Long span beams must be supported to prevent rotation and twist.

Deflection is limited to span/200 for aesthetical appeal. A safety factor of 1.6 applies to all specified loadings in this section.



# Channel Selection Chart

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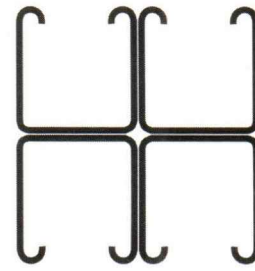
## UL1000 Series (Page 8 - 11)



UL1000



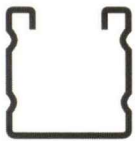
UL1001



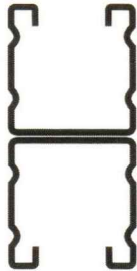
UL1001-C41

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## UL2000 Series (Page 12 - 14)



UL2000



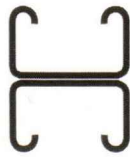
UL2001

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## UL3300 Series (Page 15 - 17)



UL3300



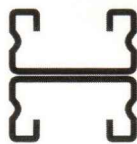
UL3301

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## UL4000 Series (Page 18 - 20)



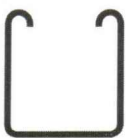
UL4000



UL4001

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## Pierced Channels (Page 21 - 23)



UL1000T



UL3300T

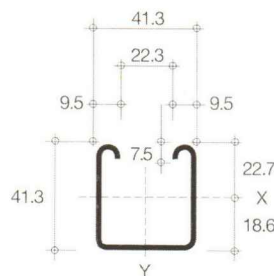
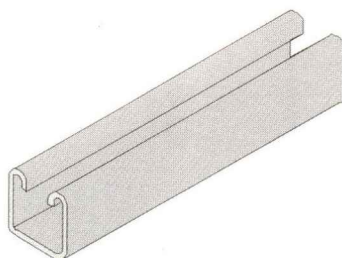
### Slot Details

UL1000T and UL3300T slots are 14 x 28mm or 10 x 28mm at 50mm centers

# UL1000 Series

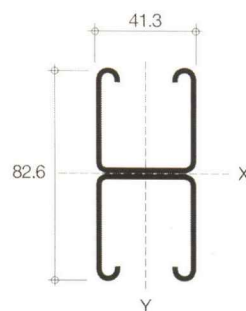
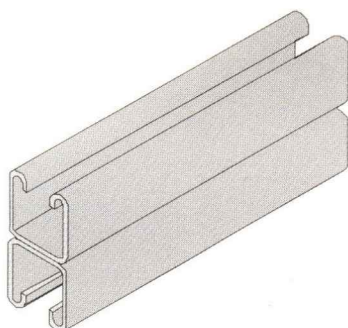
## UL1000 Series

Weight: 2.75kg per metre



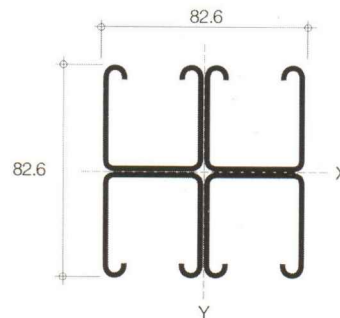
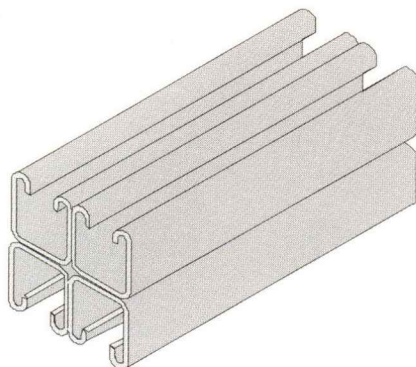
## UL1001 Series

Weight: 5.5kg per metre



## UL1001 - C41 Series

Weight: 11kg per metre



### Elements of Section

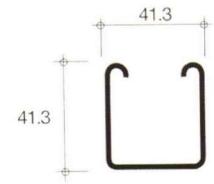
Channel Description	Thickness	Area of Section	Weight Steel	Axis X-X			Axis Y-Y		
				$I \cdot 10^3$	$Z \cdot 10^3$	r	$I \cdot 10^3$	$Z \cdot 10^3$	r
	mm	mm <sup>2</sup>	kg/m	mm <sup>4</sup>	mm <sup>3</sup>	mm	mm <sup>4</sup>	mm <sup>3</sup>	mm
UL1000	2.50	335.6	2.75	72.13	3.13	14.66	91.77	4.44	16.54
UL1001	2.50	671.2	5.52	367.95	8.91	23.41	183.54	8.88	16.54
UL1001-C41	2.50	1342.4	11.02	838.98	19.38	25.00	1055.76	24.38	28.04

I = Moment of Inertia

Z = Section Modulus

r = Radius of Gyration

# UL1000 Channel



## Beam Loading Data UL1000

Simply supported beam - Span	Safe total working load on beams			
	load applied as UDL for stress - cum - stability criteria	load applied as concentrated load for stress - cum - stability criteria	load applied as UDL for deflection criteria - Span / 200	load applied as concentrated load for deflection criteria - Span / 200
mm	kg	kg	kg	kg
250	1409	704	1409	704
500	704	352	704	352
750	470	235	470	235
1000	352	176	352	176
1250	282	141	282	141
1500	235	117	235	117
1750	201	101	181	101
2000	176	88	138	87
2250	157	78	109	68
2500	141	70	89	55
2750	128	64	73	46
3000	117	59	62	38

## Column Loading Data UL1000

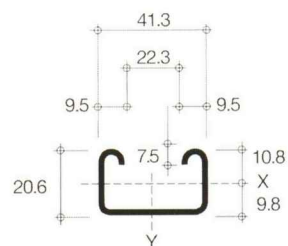
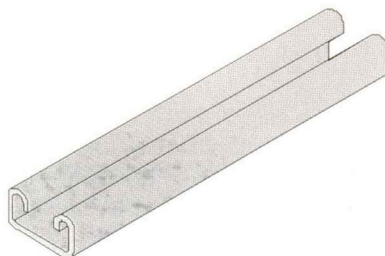
Unbraced Column height	Safe total working load on column applied at the centroid of the section			Safe total working load on column applied at the slot of the section
	K = 0.80	K = 1.00	K = 1.20	
mm	kg	kg	kg	kg
250	4713	4663	4609	1353
500	4493	4364	4223	1326
750	4223	3988	3726	1289
1000	3904	3535	3117	1238
1250	3535	3005	2392	1166
1500	3117	2392	1863	1061
1750	2624	1938	1496	961
2000	2192	1605	1226	871
2250	1863	1352	1006	791
2500	1605	1152	823*	718
2750	1397	971	687*	643
3000	1226	823*	584*	575

\*  $\frac{KL}{r}$  exceeds 200

# UL3300 Series

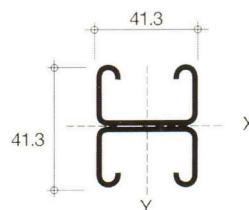
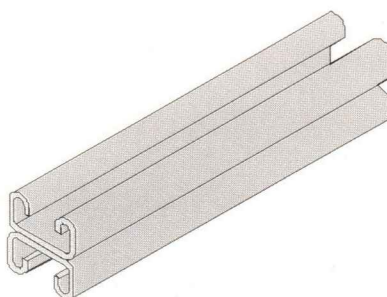
## UL3300

Weight: 1.97kg per metre



## UL3301

Weight: 3.91kg per metre



### Elements of Section

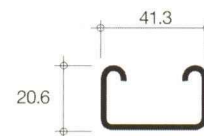
Channel Description	Thickness	Area of Section	Weight Steel	Axis X-X			Axis Y-Y		
				$I \cdot 10^3$	$Z \cdot 10^3$	r	$I \cdot 10^3$	$Z \cdot 10^3$	r
	mm	mm <sup>2</sup>	kg/m	mm <sup>4</sup>	mm <sup>3</sup>	mm	mm <sup>4</sup>	mm <sup>3</sup>	mm
UL3300	2.5	232.1	1.97	11.86	0.98	7.15	52.76	2.55	15.05
UL3301	2.5	464.2	3.91	56.91	2.76	11.07	105.52	5.11	15.05

I = Moment of Inertia

Z = Section Modulus

r = Radius of Gyration

# UL3300 Combination Channel



## Beam Loading Data UL3300

Simply supported beam - Span	Safe total working load on beams			
	load applied as UDL for stress - cum - stability criteria	load applied as concentrated load for stress - cum - stability criteria	load applied as UDL for deflection criteria - Span / 200	load applied as concentrated load for deflection criteria - Span / 200
mm	kg	kg	kg	kg
250	441	221	441	221
500	221	110	221	110
750	147	74	147	74
1000	110	55	91	55
1250	88	44	58	36
1500	74	37	40	25
1750	63	32	30	19
2000	55	28	23	14
2250	49	25	18	11
2500	44	22	15	9
2750	40	20	12	8
3000	37	18	10	6

## Column Loading Data UL3300

Unbraced Column height	Safe total working load on column applied at the centroid of the section			Safe total working load on column applied at the slot of the section
	K = 0.80	K = 1.00	K = 1.20	
mm	kg	kg	kg	kg
250	3099	3007	2905	821
500	2676	2410	2109	769
750	2109	1600	1245	662
1000	1465	1071	816	550
1250	1071	766	543*	457
1500	816	543*	386*	367
1750	619	407*	291*	299
2000	481*	318*	230*	248
2250	386*	258*	-	210
2500	318*	214*	-	180
2750	268*	-	-	-
3000	229*	-	-	-

\*  $\frac{KL}{r}$  exceeds 200