Steadmans

CI/SfB (2-) Nh2

February 2009

PURLINS, RAILS & EAVES BEAMS

ZED PURLIN SYSTEMS · EAVES BEAMS · ZED & CEE SHEETING RAILS · FLOOR CEES

Contents

A. Steadman & Son Ltd • Warnell • Welton • Carlisle • CA5 7HH Tel (0169 74) 78 277 Fax (0169 74) 78530

Contents

Introduction

Steadmans new brochure for cold rolled products contains details of our increased range of Zed, Cee and Eaves Beam sections and accessories.

Section profiles and dimensions are included along with load tables, structural properties, detailing information and typical construction details.

The new section range offers complete compatibility between Zed and Cee sections sizes.

The products are formed from hot dipped galvanised steel coil to BS EN 10147 Fe E350G -Z275.

The sections are designed to BS 5950: Part 5: 1998 using a combination of rational analysis and component testing carried out at Strathclyde University and are supported by full scale in house tests.

The load tables are complemented by a design program which allows optimum design for a large number of practical cases, including snow drift.

Steadmans realise that our standard range will not meet all requirements and therefore customer designed Zed, Cee and Eaves Beam sections can be manufactured along with individual designs for special applications.

Our extensive stock of full width coils in various gauges and our capability to cut, fold and punch these materials allow us to offer solutions to almost all situations.

Please consult Steadmans Sales Department for further details.

Steadmans Manufacturers of Cladding Products for the Construction Industry
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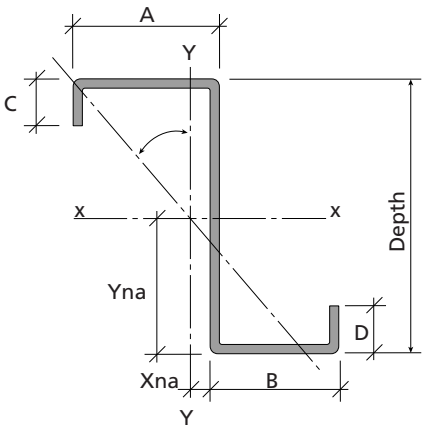
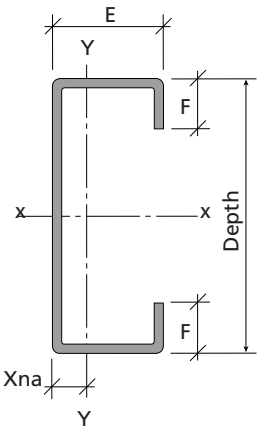
Zed & Cee Section Range



Dimensions in mm

Section Depth	Zeds				Cees	
	A	B	C	D	E	F
140,170	60	54	16	20	62	13
200	70	64	16	20	70	15
240	75	67	18	22	74	17
300	95	87	21	25	95	19



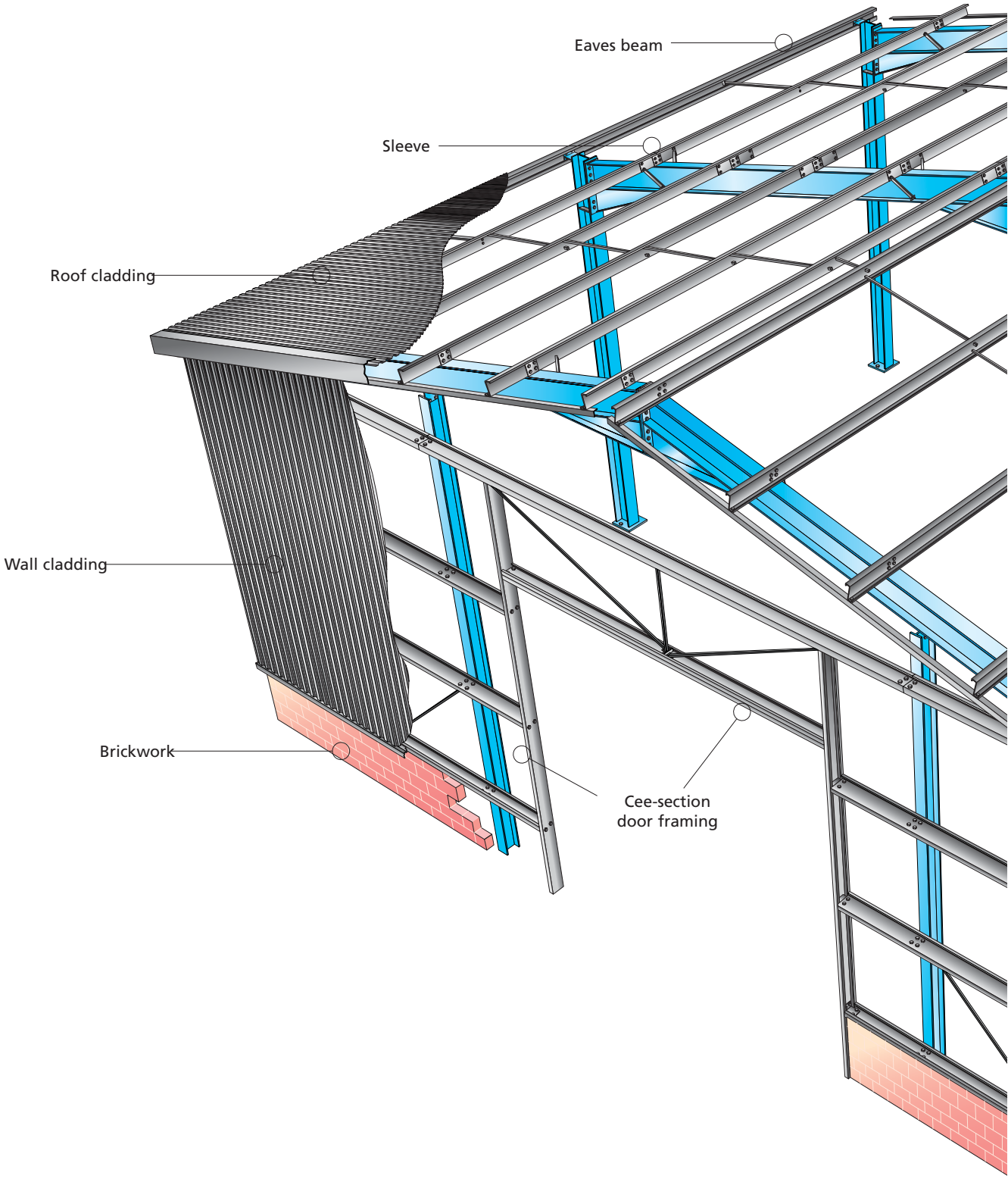
STANDARD ZEDS

Section	Wt	Area	Zxe	Zyy	Ixx	Iyy	Rx	Ry	Poc	Qs	a	xna	yna	Mc
14014	3.06	3.89	16.61	5.05	119.3	29.6	55.4	27.6	323.9	0.686	22.4	0.0	70.7	5.38
14016	3.48	4.43	19.03	5.71	135.4	33.4	55.3	27.4	336.1	0.727	22.3	-0.1	70.7	6.40
14018	3.90	4.97	21.34	6.34	151.2	37.0	55.2	27.3	346.4	0.760	22.2	-0.2	70.7	7.39
14020	4.32	5.50	23.57	6.97	166.8	40.6	55.1	27.2	355.4	0.789	22.2	-0.3	70.7	8.38
17015	3.62	4.61	23.22	5.38	200.6	31.5	65.9	26.1	314.8	0.641	17.3	-0.1	85.8	7.31
17016	3.86	4.91	24.77	5.70	213.3	33.4	65.9	26.1	321.4	0.658	17.3	-0.1	85.8	7.96
17018	4.33	5.51	27.76	6.34	238.4	37.0	65.8	25.9	332.9	0.686	17.2	-0.2	85.8	9.24
17020	4.79	6.10	30.67	6.96	263.2	40.6	65.7	25.8	324.7	0.712	17.1	-0.3	85.8	10.51
17025	5.94	7.57	37.73	8.44	323.6	49.0	65.4	25.5	361.2	0.773	17.0	-0.6	85.8	13.63
20016	4.48	5.71	33.67	7.45	344.8	51.1	77.7	29.9	304.3	0.604	16.7	-0.2	100.7	10.25
20018	5.03	6.41	38.04	8.29	385.8	56.8	77.6	29.8	316.8	0.638	16.7	-0.3	100.7	12.05
20020	5.58	7.10	42.20	9.12	426.2	62.3	77.5	29.6	327.4	0.664	16.6	-0.4	100.7	13.82
20025	6.92	8.82	52.13	11.10	525.3	75.6	77.2	29.3	348.3	0.720	16.5	-0.6	100.7	18.16
24018	5.77	7.35	50.79	9.55	621.3	69.8	92.0	30.8	298.7	0.580	14.2	0.1	121.4	15.17
24020	6.39	8.14	56.41	10.51	686.9	76.7	91.8	30.7	310.5	0.607	14.2	0.0	121.4	17.51
24025	7.94	10.12	69.86	12.82	848.1	93.3	91.6	30.4	333.4	0.657	14.1	-0.2	121.4	23.29
24030	9.47	12.07	82.82	15.01	1005.0	108.8	91.3	30.0	350.3	0.702	14.0	-0.5	121.4	29.01
30025	10.02	12.77	111.24	20.86	1693.0	193.5	115.2	38.9	310.0	0.602	14.4	-0.2	151.3	34.49
30030	11.97	15.25	132.83	24.56	2012.0	227.2	114.9	38.6	328.9	0.646	14.3	-0.5	151.3	43.68

STANDARD CEES

Section	Wt	Area	Zxe	Zyy	Ixx	Iyy	Rx	Ry	Poc	Qs	xna	yna	Mc
14014	3.06	3.89	16.73	4.45	122.0	19.3	56.0	22.3	323.3	0.672	18.6	70	5.41
14016	3.48	4.43	19.41	5.02	138.4	21.8	55.9	22.2	335.5	0.720	18.6	70	6.51
14018	3.90	4.97	21.91	5.58	154.6	24.2	55.8	22.1	345.8	0.757	18.6	70	7.58
14020	4.32	5.50	24.29	6.12	170.5	26.6	55.7	22.0	354.7	0.788	18.6	70	8.61
17015	3.62	4.61	23.49	4.84	204.2	21.9	66.5	21.8	314.3	0.631	16.8	85	7.38
17016	3.86	4.91	25.16	5.13	217.1	23.2	66.5	21.7	320.9	0.651	16.8	85	8.07
17018	4.33	5.51	28.37	5.70	242.6	25.7	66.4	21.6	332.3	0.683	16.8	85	9.43
17020	4.79	6.10	31.43	6.26	267.8	28.2	66.2	21.5	342.1	0.710	16.8	85	10.75
17025	5.94	7.57	38.73	7.58	329.3	34.2	66.0	21.3	361.2	0.773	16.8	85	13.99
20016	4.48	5.71	33.69	6.74	347.7	34.6	78.0	24.6	304.3	0.596	18.7	100	10.25
20018	5.03	6.41	38.29	7.50	389.0	38.5	77.9	24.5	316.8	0.633	18.7	100	12.13
20020	5.58	7.10	42.67	8.25	429.8	42.3	77.8	24.4	327.4	0.662	18.7	100	13.97
20025	6.92	8.82	52.93	10.03	529.7	51.4	77.5	24.1	348.3	0.719	18.7	100	18.43
24018	5.77	7.35	51.16	8.82	625.7	48.7	92.3	25.8	298.9	0.575	18.8	120	15.29
24020	6.39	8.14	57.11	9.70	691.9	53.6	92.2	25.7	310.7	0.604	18.8	120	17.74
24025	7.94	10.12	71.09	11.83	854.2	65.3	91.9	25.4	333.6	0.657	18.8	120	23.71
24030	9.47	12.07	84.35	13.84	1012	76.3	91.6	25.2	350.3	0.702	18.8	120	29.55
30025	10.02	12.77	112.04	18.98	1705	135.2	115.6	32.5	310.0	0.597	23.8	150	34.73
30030	11.97	15.25	134.59	22.32	2026	159.0	115.3	32.3	328.9	0.644	23.8	150	44.26

Product Range Overview



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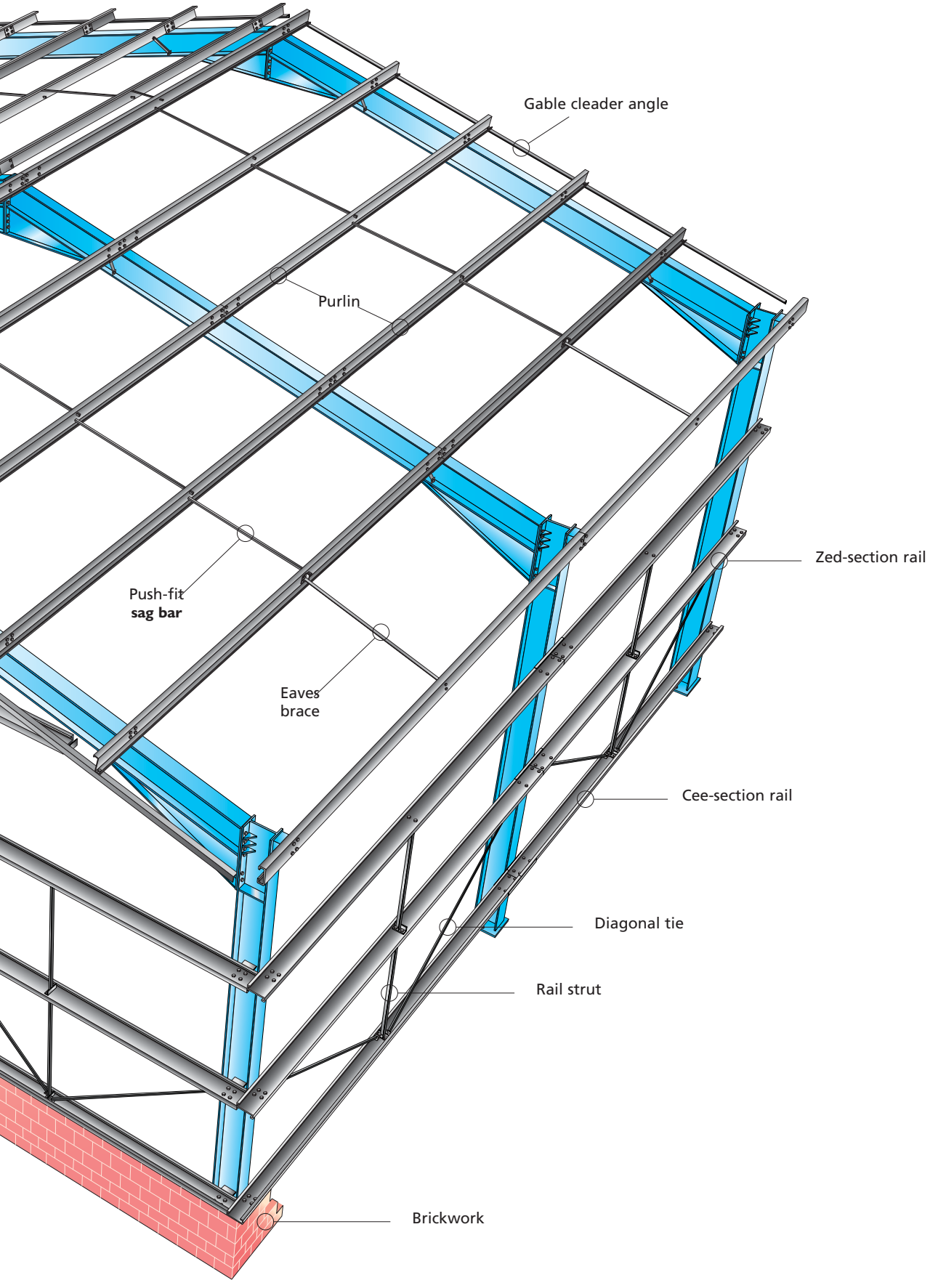
Product Range Overview



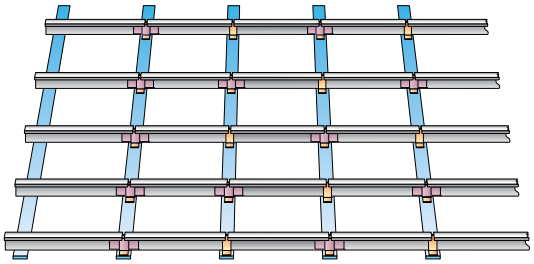
Zed Purlin Systems

Four structural systems are available, the Sleeved System, Double-Span Sleeved System, Heavy End-Bay System and the Butted System. These systems allow for a flexible and efficient range of solutions to roofing supports for a wide variety of cladding types, the major features of which are outlined below.

SLEEVED SINGLE-SPAN SYSTEM

This is the traditional system of single bay-length sections with sleeves at all penultimate supports and at alternative internal supports. The system may be used with all types of claddings and roof pitches, within the limitations given in this manual. **Minimum number of spans is 2 and the maximum span is 12.5m.**

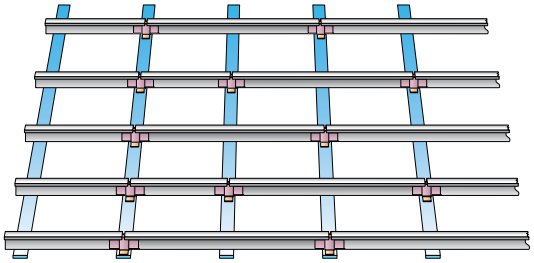
DETAILS ON PAGE 45
LOAD TABLES ON PAGE 33



SLEEVED DOUBLE-SPAN SYSTEM

Sleeves are provided at all penultimate supports and are staggered at internal bays. The advantage is a reduced number of erection components when compared with the Sleeved System. Note that maximum section length is restricted to 15m for transport and handling reasons. Consideration should be given to handling and erection sequence when utilising the double-span sections. **Minimum number of spans is 4 and the maximum span is 7.5m.**

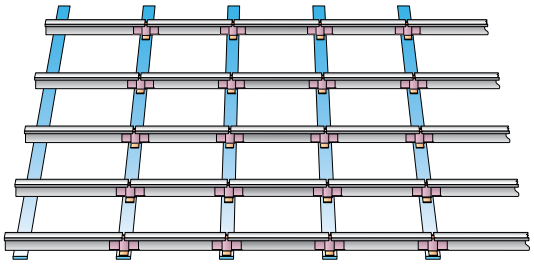
DETAILS ON PAGE 45
LOAD TABLES ON PAGE 33



HEAVY END-BAY SINGLE-SPAN SYSTEM

This is a highly efficient sleeved-system, with sleeves at all supports thus allowing a form of continuous beam design. Inner bay sections and sleeves are thinner than at the end bay thus allowing an economic solution for long buildings. Sleeves at penultimate supports are of the same thickness as the outer bay purlin section. **Minimum number of spans is 4 and maximum span is 12.5m.**

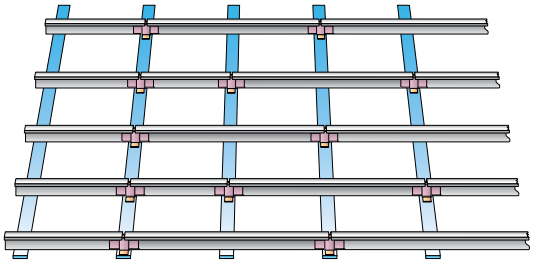
DETAILS ON PAGE 45
LOAD TABLES ON PAGE 37



HEAVY END-BAY DOUBLE-SPAN SYSTEM

Sleeves are provided at all penultimate supports and are staggered at internal bays. The advantage is a reduced number of erection components. Inner bay sections and sleeves are thinner than at the end bay thus allowing an economic solution for long buildings. Sleeves at penultimate supports are of the same thickness as the outer bay purlin section. **Minimum number of spans is 4 and maximum span is 12.5m.**

DETAILS ON PAGE 45
LOAD TABLES ON PAGE 37



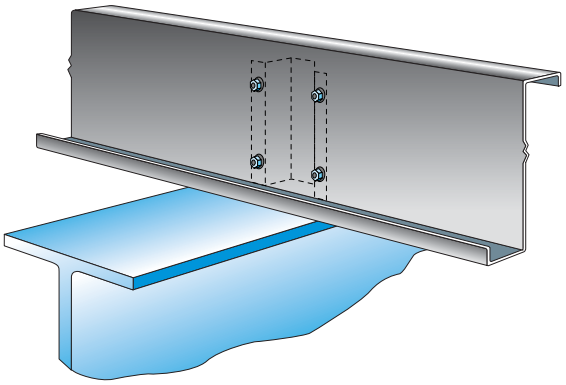
SLEEVED PURLIN SYSTEM

SINGLE/DOUBLE SPAN LENGTHS

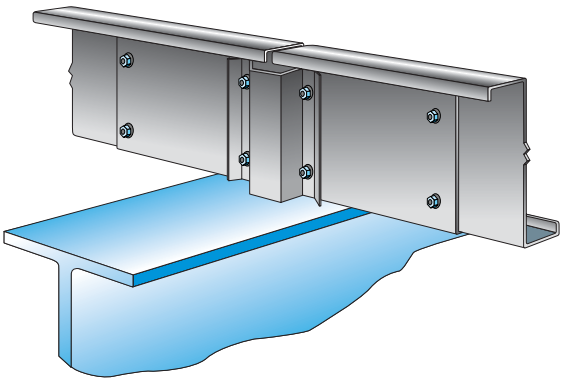
Refer to page 3 for overview of system and sleeve requirements. This system may be used with restraining or non-restraining cladding, and may also be used to support tiled roof systems.

The system may require to be used in conjunction with sag-systems as identified for various conditions on page 8. Consideration should be given to handling and erection sequence when utilising the double-span section.

DOUBLE SPAN CONNECTION



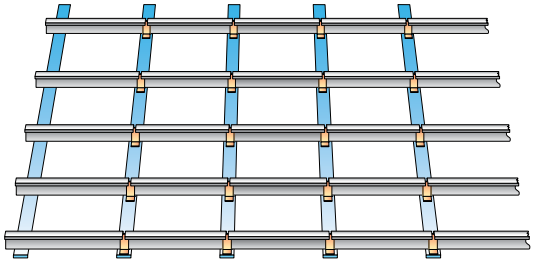
SLEEVED CONNECTION



BUTTED SINGLE-SPAN SYSTEM

The system is required for buildings of a single span length and is efficient for short spans or light loadings. Butted purlins are also useful for frames which have large clear spans and where large frame deflections may be harmful to continuous purlin systems. Butted purlins can be used over supports or within the depth of the supporting section. **Maximum span is 11.4m.**

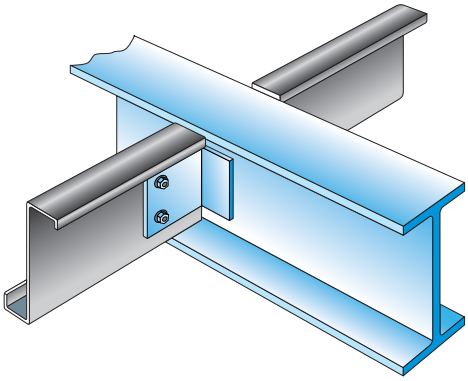
DETAILS ON PAGE 45
LOAD TABLES ON PAGE 35



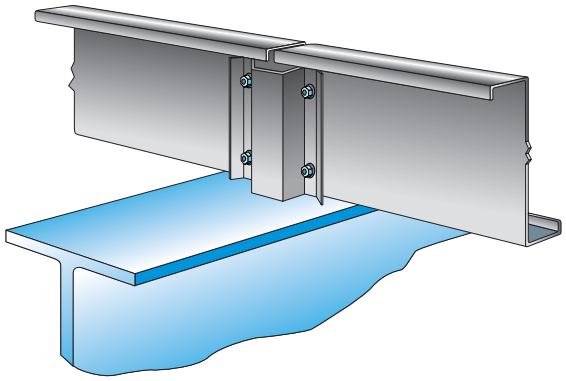
BUTTED PURLIN SYSTEM

This system is useful for single-span conditions, either over-supports or flush with supports. The system is also economical for small bays or light loadings, where sleeves are not necessary.

BUTTED CONNECTION
with inset cleat for flush construction



BUTTED CONNECTION



ROOF SAG-SYSTEM REQUIREMENTS

The anti-sag-system required for any given case will depend on the loadings, span, cladding type and roof pitch. Different claddings provide varying restraint to the purlin and it is extremely important that the roof designer should be clear on the type of roof cladding prior to selecting a suitable sag system. For purlin design purposes within the scope of this manual the following list outlines the main cladding types to be considered:

1) Restraining type metal cladding.

2) Non-restraining type metal cladding.

3) Hook bolt fixed cladding.

4) Tiled roofs.

Lateral restraint is usually provided to the purlin where normal trapezoidal, or composite cladding is through-fixed to the purlins and where the sheets are fixed together by side lap stitching. Standing seam roofs and some forms of secret fix panels have fixings which allow relative movement between the purlin and the cladding and these panels should be regarded as non-restraining unless used in conjunction with a suitable liner panel. A suitable liner panel should be sufficiently robust to carry compressive restraint forces and should be positively fixed to the purlin and it is also recommended that side lap stitching is adopted to form a roof plane diaphragm.

Some claddings, such as fibre cement panels, are fixed by hook bolts. These claddings offer a reduced degree of restraint to the purlin under wind uplift conditions and the limitations given in this section should be observed for this application. Wind uplift capacities are reduced, and sections for these roofs should be selected using the design disk.

See the Tiled Roof section for additional sag system requirements for tiled roofs.

Sag system recommendations for various roof conditions are provided in the table right and these should be used as appropriate. Use of the sag systems indicated will provide optimum wind uplift capacity and will provide a good basis for stability and alignment during erection.

In the case of restraining type metal cladding a reduced number of rows of sag bars may be appropriate in particular circumstances. It should be clear that these reduced systems should only be used in conjunction with the appropriate load tables which, depending on span, may have significantly reduced wind uplift values. The following points should be considered for reduced numbers of sag bars:

1. Reduced number of sag member rows applies only to restrained type metal cladding.

2. For roof slopes less than 3 degrees, 0 rows may be used for spans up to 4.6m and 1 row of angle braces may be used for spans up to 12.5m

3. For roof slopes between 3 -25 degrees, 0-rows may be used for spans up to 7.6m and 1-row of push fit sag bars may be used for spans up to 12.5m.

4. Use the reduced wind uplift capacity relevant to the number of rows of sag members selected.

5. Temporary stability during erection, and other Health & Safety issues should be considered when choosing a suitable sag system.

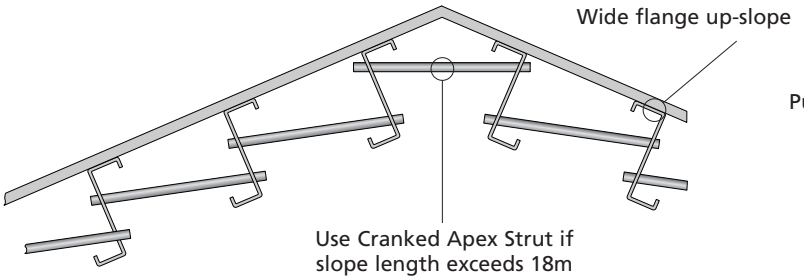
6. When 0 rows of sag members are used it is recommended that one row of eaves braces and ridge struts be used.

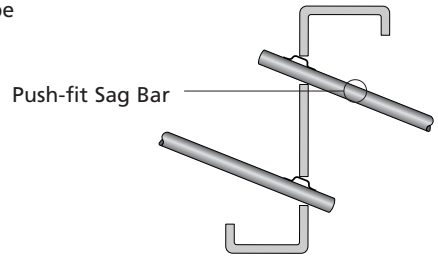
Cladding System	Slope Roof	ROOF SAG SYSTEM DETAILS		
		<4.6m Span	4.6m-7.6m Span	7.6m-12.5m Span
Metal Cladding (Restraining Type)	< 3°	1 row angle braces		2 rows angle braces
	3°-25°	0 rows	1 row bars	2 rows bars
	25°-35°	1 row angle braces +diagonals		2 rows angle braces + diagonals
Metal Cladding (Non-Restraining Type)	< 3° 3°-25°	1 row angle braces		2 rows angle braces
	25°-35°	1 row angle braces +diagonals		2 rows angle braces + diagonals
Hook-bolt (Restraining Type)	< 3°	Not Recommended		
	3°-25°	1 row bars		2 row bars
	25°-35°	1 row angle braces +diagonals		2 rows angle braces + diagonal

ROOF SAG BAR SYSTEM

Useful for restraining metal cladding and hook bolt cladding within the limit of the table. Suitable for purlins up to 240mm deep.

Push-fit sag bars are used up to 2.0m purlin centres. Refer to Steadmans if centres are greater than 2m. (Refer to table on page 8 for limitations of use.)

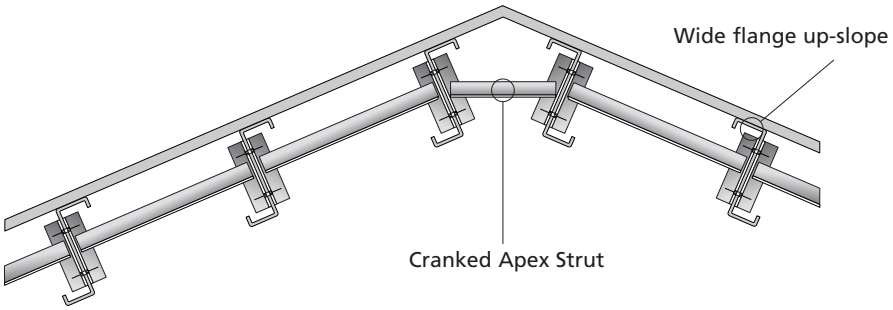


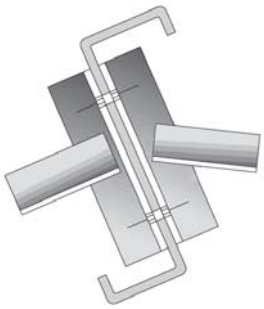


ROOF ANGLE BRACE SYSTEM

Useful for non-restraining cladding, tiled roofs and for purlins 300mm deep and steep roofs (ie. over 25°)

45x45x2 angle braces may be used up to 2.0m purlin centres. Refer to Steadmans if centres are greater than 2m. (Refer to table on page 8 for limitations of use.)





GENERAL NOTES

Note that where sag bar numbers are reduced, within the limits of this manual, it may be necessary to use temporary bracing to the top flange to avoid twisting of zed purlins during installation, particularly on roofs with shallow or steep slopes. In the case of 0-rows of sag bars it is recommended that eaves braces are fitted (see Eaves Beam section of manual) and that a ridge bar or cranked apex strut is fitted, as in above details.

Where sag bars or angle braces are used they should be positioned at mid-span for a single row and at 3/8,1/4,3/8 span for a double row, for optimum resistance to wind uplift.

Refer to the Eaves Beam section of the manual for general recommendations for sag systems at eaves.

Refer to the Tiled Roof section for advice on dealing with such heavy roofing systems.

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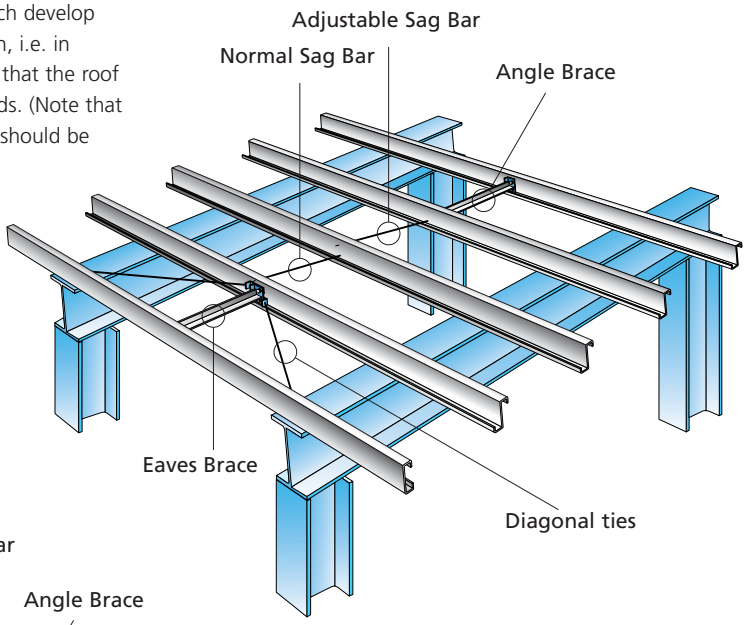
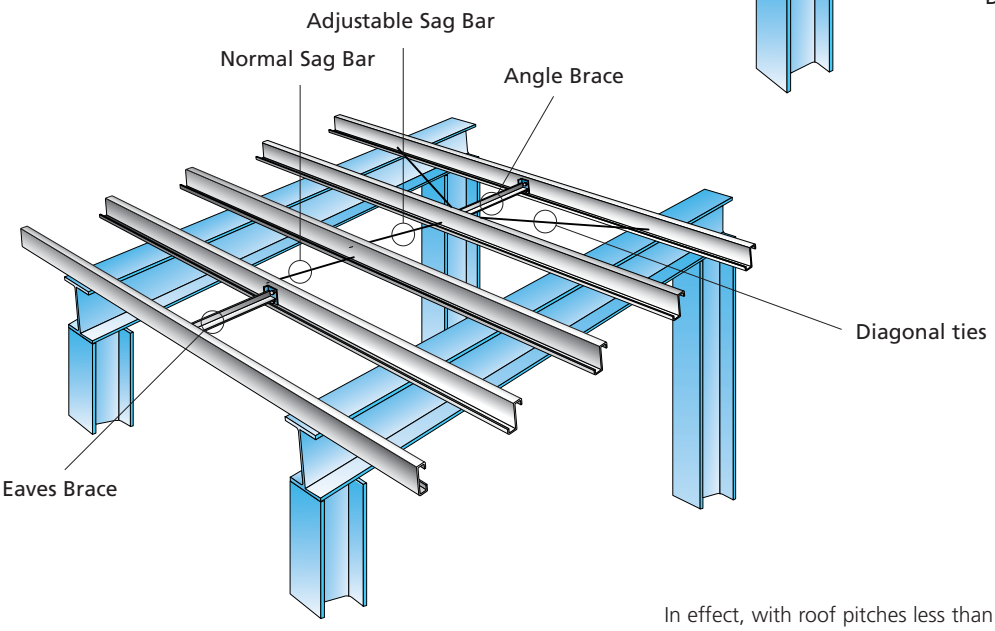
MONOPITCH ROOFS

In a monopitch roof all the roof plane forces act up or down the roof unlike a ridged roof which has balancing roof load components acting through the ridge cladding and sag system. In the case of monopitches all roof-plane loads have to be resisted by the purlins, claddings, cleats and sag systems. However, with zed purlins the restraint forces which develop due to gravity loadings act in an up-slope direction, i.e. in opposition to the down-slope load component so that the roof system need only resist the net effect of these loads. (Note that a ridged roof which is not connected at the ridge should be considered as two monopitches.)

PLAN ON ROOF WITH PITCH OF UP TO 6°





PLAN ON ROOF WITH PITCH GREATER THAN 6°

In effect, with roof pitches less than a critical value there is a net force acting up the slope and for greater roof slopes the force will act downslope.

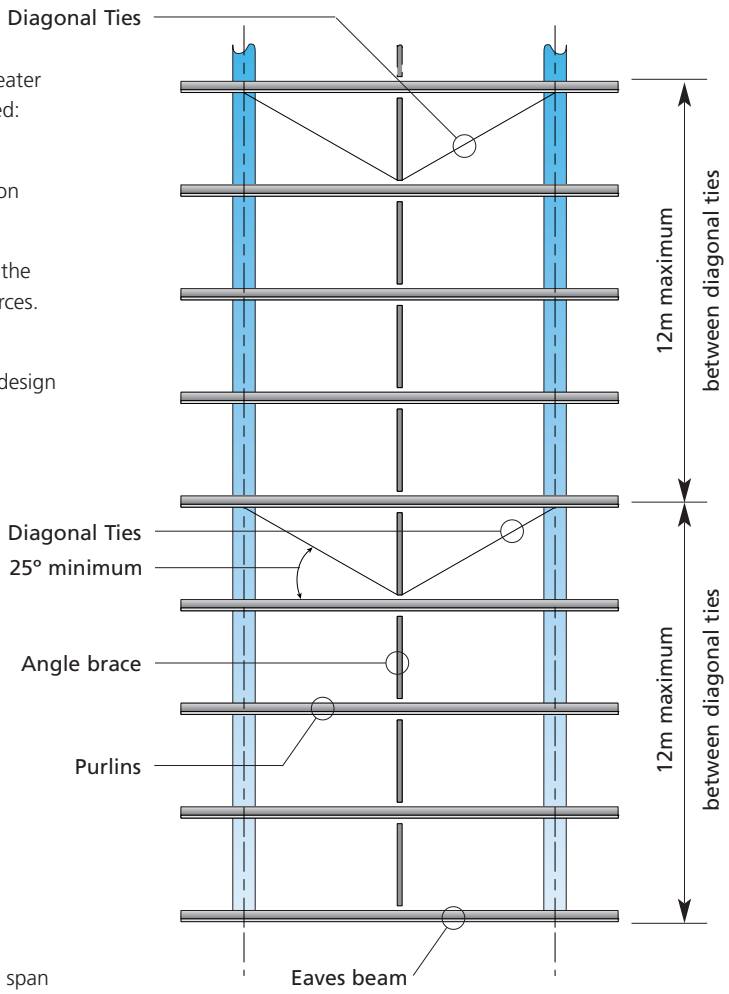
The critical angle of roof pitch depends on a number of factors and can only be approximated with current knowledge. As an aid to designers it is recommended that diagonal ties and struts should be used to assist with load distribution in these roofs. The adjacent diagrams indicate the recommended placement of such elements for roof pitches less or greater than 6 degrees, at which pitch roof forces are assumed to be approximately in balance.

Note: Anti-Sag bars (number of rows and type) to be taken from the table on page 8.

STEEP PITCH ROOFS

Where roof slopes are greater than 25 degrees but no greater than 35 degrees the following points should be considered:

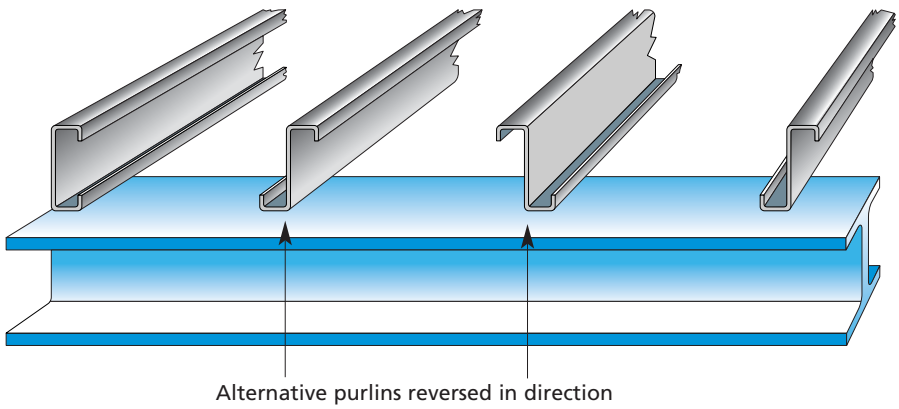
1. Use angle braces and cranked apex struts to replace normal sag bars. (Minimum number of rows provided on page 8).
2. Use diagonal ties at intervals of no more than 12m on the slope length, to assist with absorption of roof plane forces.
3. Reduce purlin capacity by including down-slope load component. This is most simply achieved by using the design program which automatically includes down-slope components for pitches greater than 25 degrees.
4. Check purlin cleats for down-slope load component, use heavy duty cleats if required.



PLAN ON STEEP ROOF

SHALLOW PITCH ROOFS

For very flat roofs, say below 3 degrees, particularly if the span exceeds 6m or if non restraining cladding is used then, in addition to the sag systems indicated in this manual the use of purlin reversals is highly recommended to balance the extensive up-slope restraint forces which develop due to the zed shape. This is particularly important in the case of any long slopes or monopitches and there should be slightly more zeds pointing up the slope than down slope.



Alternative purlins reversed in direction

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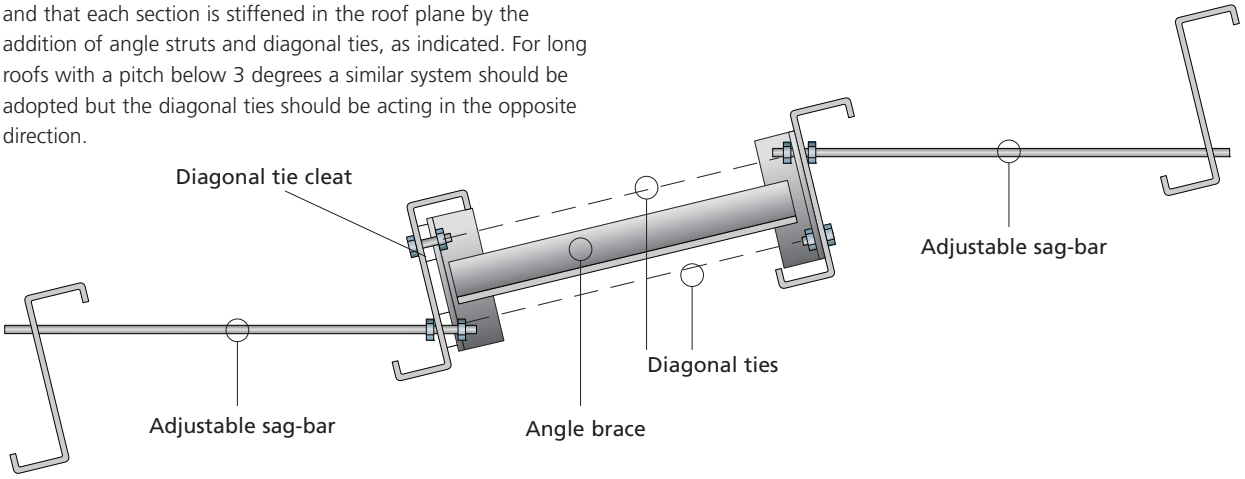
LONG ROOF SLOPES

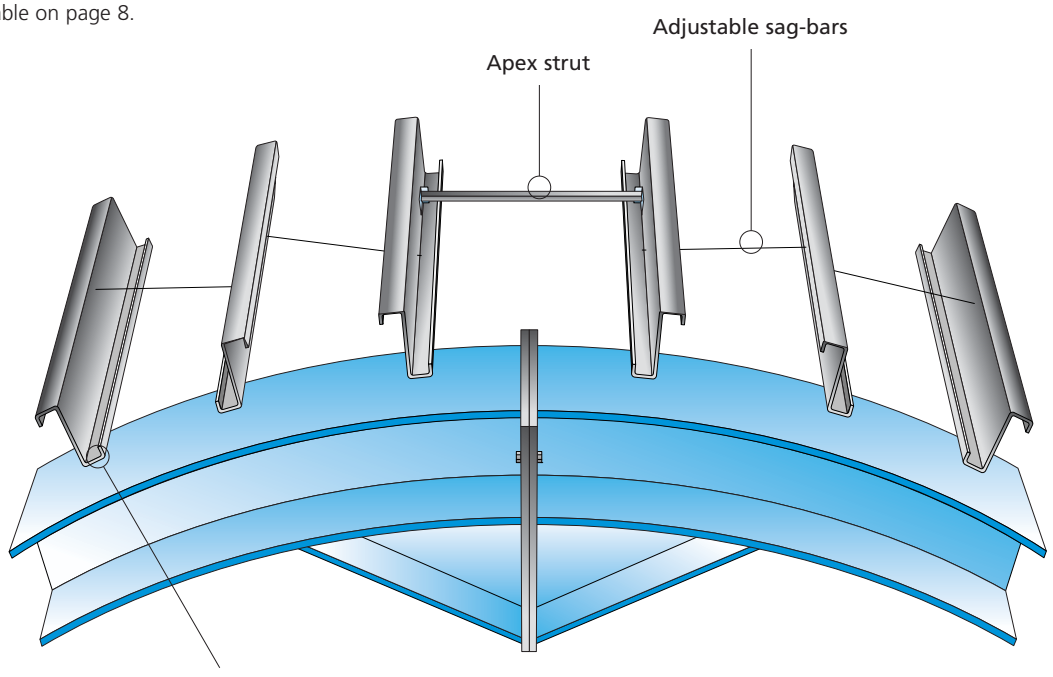
For roof slopes in excess of 20m in length (on the slope), and with a pitch of greater than 3 degrees it is recommended that each sub-length is divided into 20m (maximum) length sections and that each section is stiffened in the roof plane by the addition of angle struts and diagonal ties, as indicated. For long roofs with a pitch below 3 degrees a similar system should be adopted but the diagonal ties should be acting in the opposite direction.



CURVED ROOFS

Curved roofs become flat near the apex and it is recommended that in the near-ridge zone, when the tangent to the roof cladding is less than 3 degrees, then purlin reversals should be adopted as in the diagram. (ie The near-ridge zone is treated as a shallow pitch roof.)

Note: Anti-sag bars (number of rows and type) to be taken from the table on page 8.



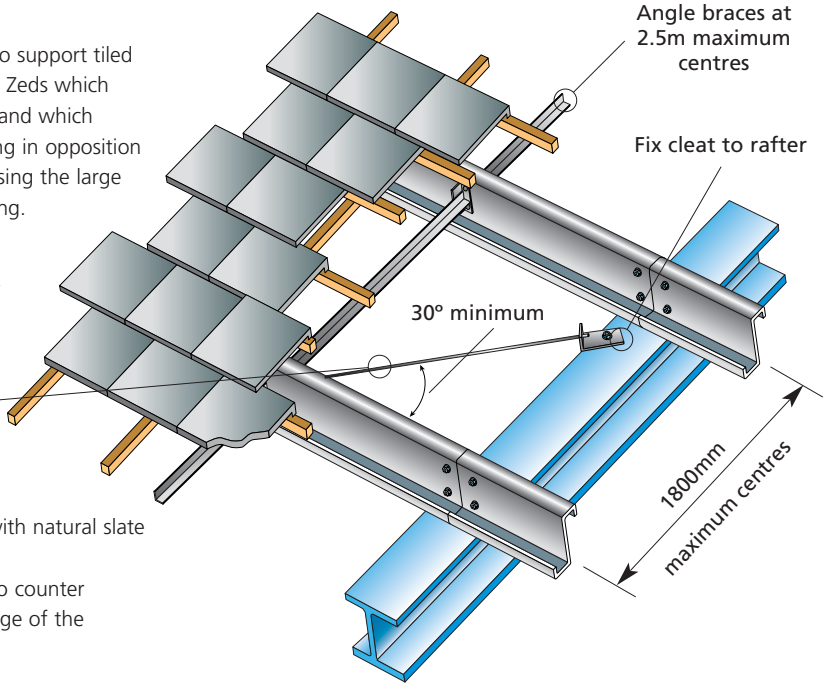
Alternative purlin directions reversed when roof tangent is less than 3°

TILED ROOFS

Cold rolled purlins are increasingly being used to support tiled roofs. This application is particularly suitable for Zeds which have principal axes inclined from the web axes and which consequently have upslope restraint forces acting in opposition to the downslope load component thus minimising the large downslope forces inherent to this form of roofing.

ROOF WITH BATTENS & COUNTER BATTENS

Note that the diagonal braces should be placed at regular positions down the roof, at centres not exceeding 5.4m for roof pitches up to 25° and not exceeding 4m for roof pitches above 25°.



Two types of application are common for use with natural slate or concrete tile materials:

1. Tiles may be fitted to timber battens nailed to counter battens which are screw fixed to the top flange of the purlins.

2. Tiles may be fitted to timber battens fixed to a proprietary metal liner tray.

Some special considerations are required when designing a tiled roof:

1. Purlins should be limited to a deflection of span/300 in the web plane to avoid visible sag.

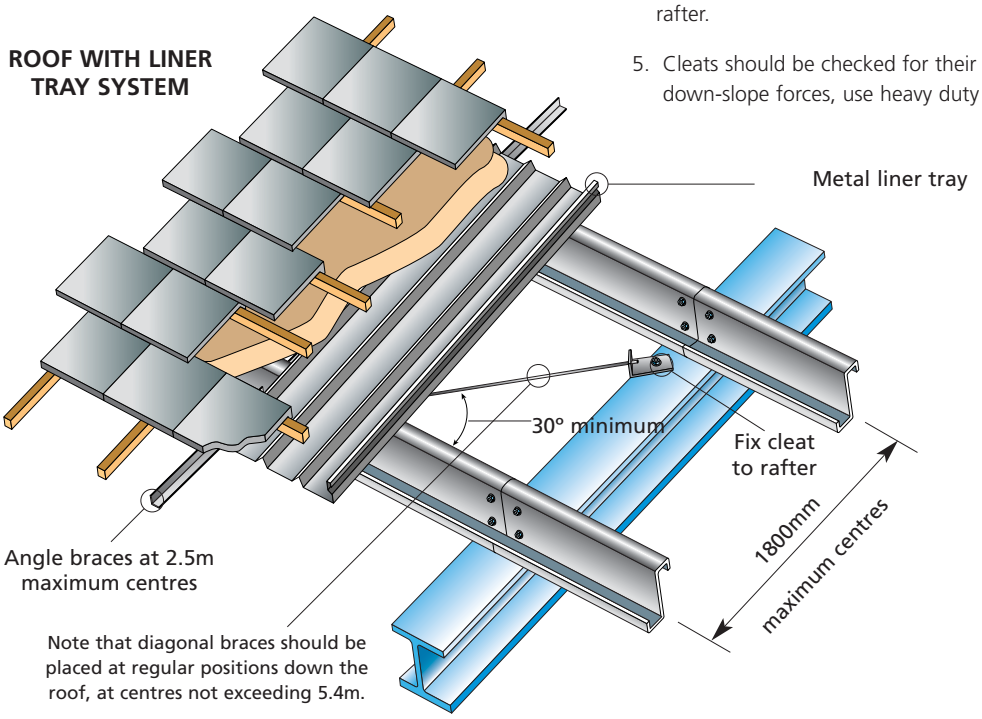
2. Where a building is ridged, when timber counter battens are used they should be bolted together at the ridge to balance the down-slope forces so far as is possible.

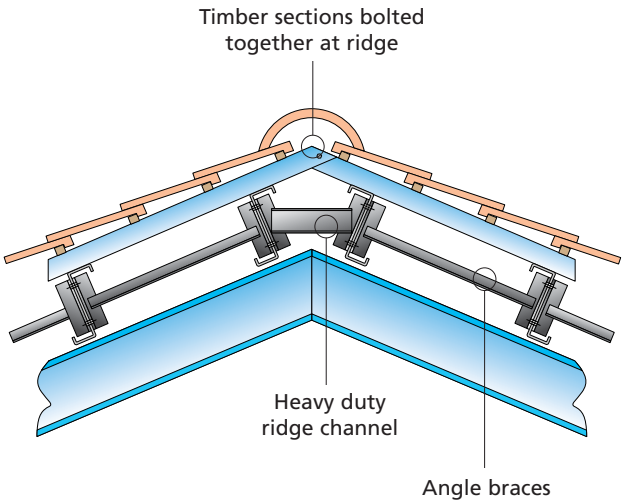
3. Any timber counter battens fixed up the slope of the roof should be attached to each other with metal straps to assist in carrying the tensile forces which will develop in the roof.

4. The Sag-System must be sufficiently robust to handle the down-slope load component, and the purlins require to be designed for two-way bending, as in the steep roof section above. Use angle braces at sag member positions, in conjunction with diagonal ties. If loadings are substantial the diagonal ties should be fixed directly to the steel supporting rafter.

5. Cleats should be checked for their ability to handle the large down-slope forces, use heavy duty cleats if necessary.

ROOF WITH LINER TRAY SYSTEM





TILED ROOFS (CONT)

No load tables are provided for this application and assistance in particular situations can be obtained by discussing the requirements with Steadmans, or the design program can be used if the roof pitch exceeds 25 degrees.

Some typical details are provided, for the purpose of general guidance in the design of these roofs.

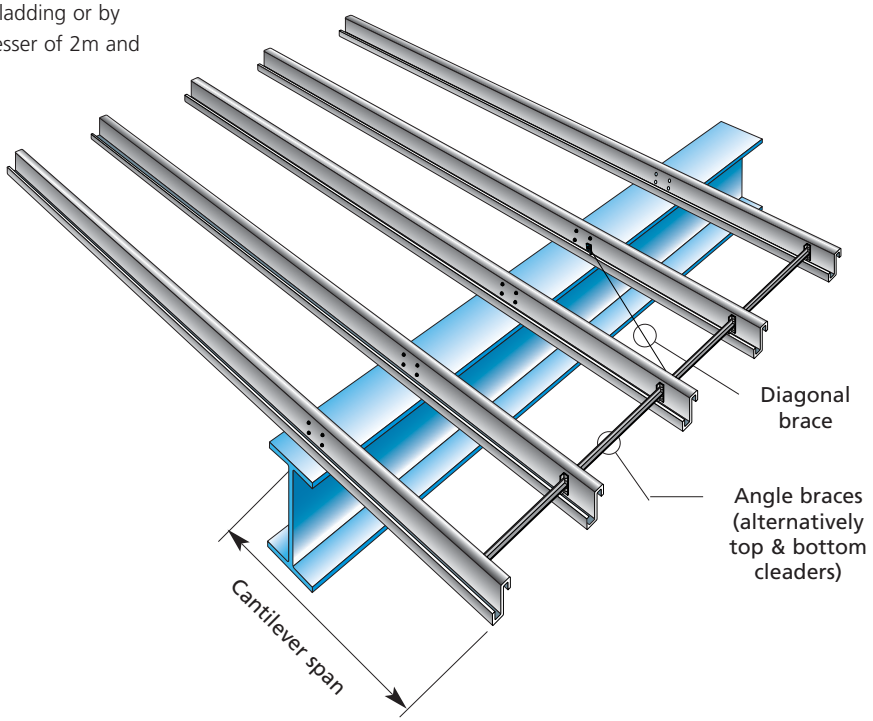
Note that in addition to the use of natural materials Steadmans offer the unique AS2000 roof system which combines the natural look of slate with the lightweight construction of pressed steel construction. (Separate information leaflets are available for this product.) Purlins for this application should be designed as for non-restraining metal cladding.

CANTILEVER PURLINS

These are frequently required to form gable overhangs, with or without deep soffit framing. Performance depends on the purlin section and on the backing span. The purlin section should be no less than that required for the adjacent main span, selected in the absence of the cantilever loading. Where deflections are critical the purlin section should be chosen accordingly, following the guidance below.

Purlin sections should be confirmed by evaluation, considering the following parameters:

1. Purlin section must be continuous over the gable frame.
2. Maximum cantilever span is 30% of the backing span, but not greater than 3m.
3. Bottom flange should be restrained by cladding or by restraints at centres not exceeding the lesser of 2m and ten times the section depth.
4. Purlin ends should be braced with cleader angles top & bottom or with an angle brace providing torsional restraint, placed near the end. Restraint should be carried across the ridge where applicable.
5. The factored BM at the support should not exceed the purlin moment capacity for gravity or wind uplift effects (Mc in the section property table).
6. Tip deflection should be limited by increasing the purlin section, if required.
7. Where the cantilever span exceeds 1.0m a diagonal tie should be fitted as in the sketch. This is particularly important in the case of steep roofs, monopitches and heavy claddings.
8. Special care is required with heavy roof claddings or tiled roof systems. Refer to Steadmans for advice in particular cases.



Eaves Beams

SECTIONS

Three depths of eaves beam are available. Folded indented sections with a maximum length of 10m are available in 200mm and 240mm depth. A 300mm deep Cee section eaves beam is available up to a span of 12.5m to complement the 300 series of purlin sections. These are available in the thicknesses indicated. Eaves beams are usually single spanning but the 200 and 240 series may be supplied as double-spanning up to a 5m span and the 300 series can be double-spanning up to a 7.5m span.

The 300mm deep eaves beams may be optionally used with counterformed holes and countersunk bolts, with either countersunk holes or spacer plates as indicated.

It is recommended that at least one row of eaves braces should be adopted, even where a zero row of sag bars is used with the purlins. Additionally the number of rows of eaves braces should not be less than the number of rows of sag bars for purlins, as in the table on page 8, or as selected by the designer to suit any particular design. Removal of eaves braces should only be carried out if the roof designer is confident that the structural implications have been fully considered.

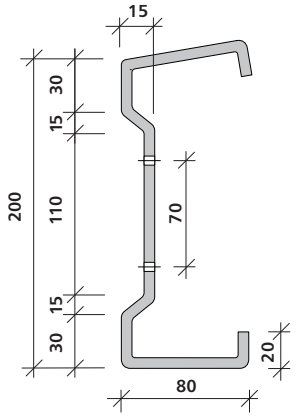
EAVES BRACES PERFORM THE FOLLOWING FUNCTIONS:-

1. Reduce the horizontal design span for side wind.
2. Assist with dispersing horizontal wind loads into the roof diaphragm.
3. Reduce any twisting due to eaves gutters and with erection of roof cladding.

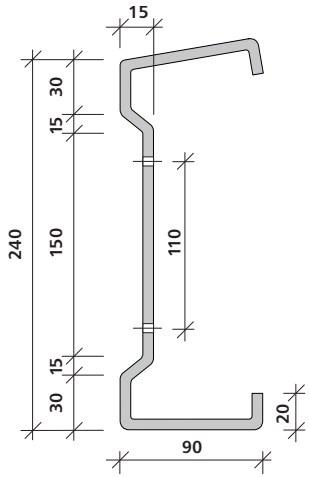
The eaves beam design tables and design disk are based on the assumption that the top flange is fully restrained by the roof cladding and care is required where this is not the case, for example where standing seam or clip-fixed cladding are used without a suitably stiff liner panel.

Most design situations can be handled using the design disk but due to the many conditions that may be met in practise, section properties are provided to assist the designer with any individual designs that may be required.

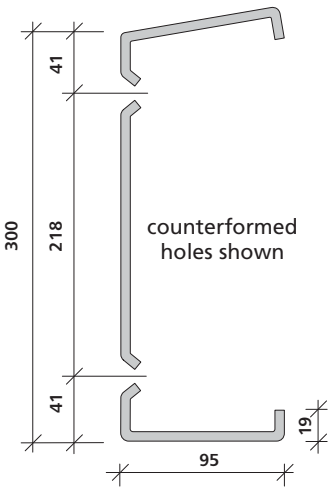
200 EAVES BEAM SERIES



240 EAVES BEAM SERIES



300 EAVES BEAM SERIES

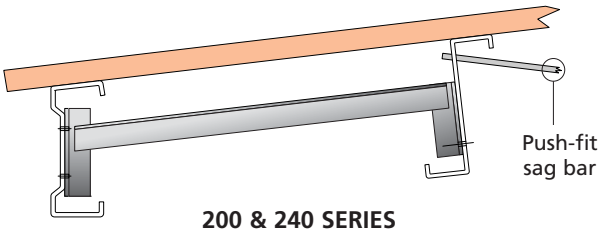


Rake to flanges available from 0 degrees to 35 degrees (above 35 degrees contact Steadmans)

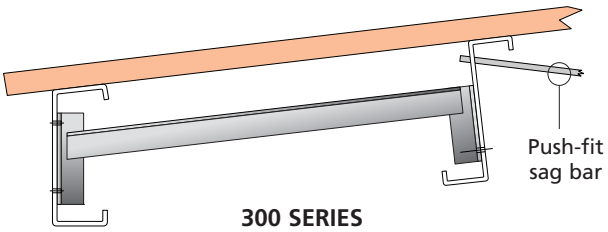
Section	Weight(kg/m)	Sxe(cm^3)	Ixx(cm^4)	Zyy(cm^3)	Iyy(cm^4)	Ryy(mm)	Poc(N/mm^2)
EB200/16	5.10	35.48	373.8	8.66	44.9	26.3	350
EB200/20	6.35	47.68	487.7	10.64	55.1	26.1	350
EB200/25	7.90	61.70	620.3	13.02	67.3	25.9	350
EB240/25	9.08	83.09	1009.3	15.80	94.1	28.5	350
EB240/30	10.84	101.18	1218.0	18.58	110.6	28.3	350
EB300/30	11.97	134.59	2026.0	22.32	159.0	32.3	329

TYPICAL EAVES BEAM DETAILS

EAVES BRACES FOR ROOF SLOPE LENGTH UP TO 18M

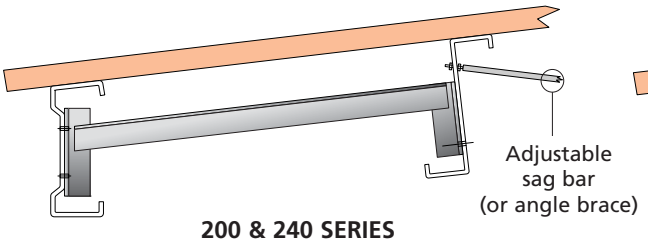


200 & 240 SERIES



300 SERIES

EAVES BRACES FOR ROOF SLOPE LENGTH GREATER THAN 18M



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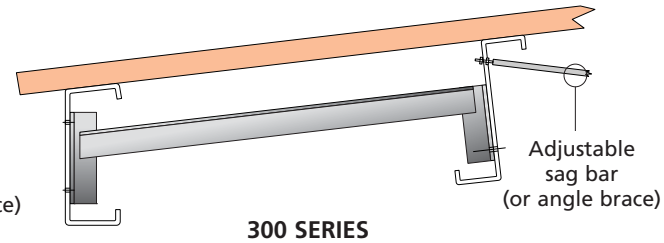
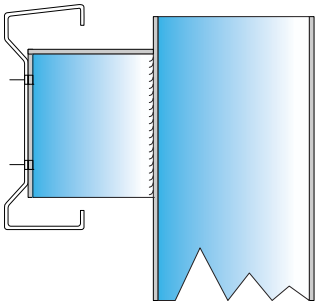
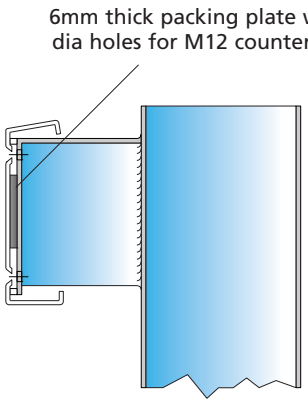


300 SERIES

TYPICAL CONNECTIONS TO COLUMN HEADS



200 & 240 SERIES

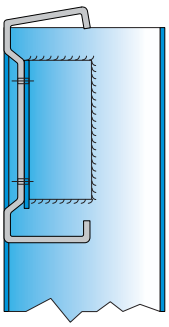


300 SERIES

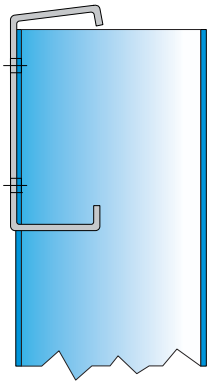
OUTSTAND CONNECTIONS

Eaves Beams

TYPICAL CONNECTIONS TO COLUMN HEADS



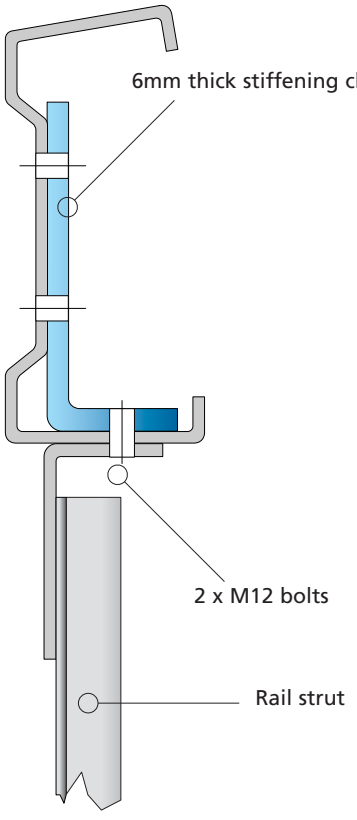
200 & 240 SERIES



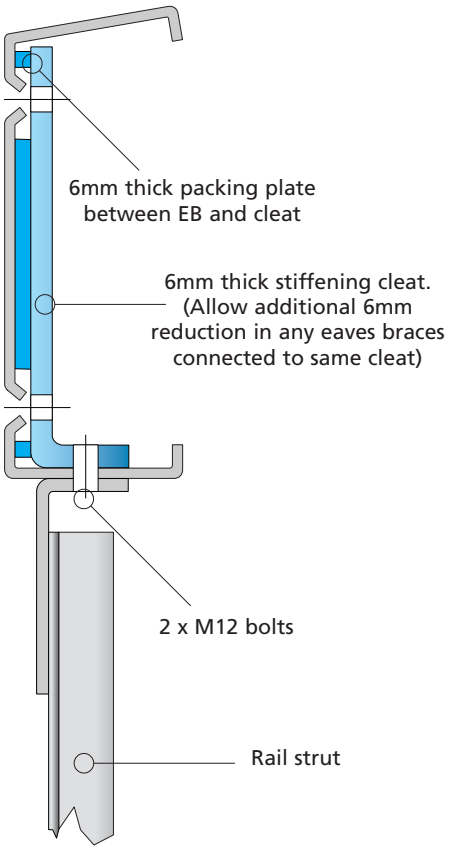
300 SERIES

FLUSH COLUMN CONNECTIONS

CONNECTIONS BETWEEN EAVES BEAMS AND RAIL STRUTS



200 & 240 SERIES



300 SERIES

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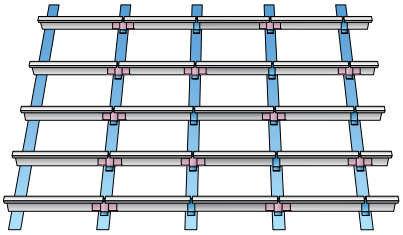
Zed & Cee Sheeting Rails

Sheeting rails may be selected as either Zed profile or Cee profile sections. These are formed from the same coils and are each available in the same depth and thickness range. Cees may be substituted for Zeds at window and door framing and at composite cladding joints, etc.

The two types of section can be mixed on the same rail line though it is not possible to locate sleeves on the junction between Zeds and Cees. Each system should be regarded separately between such junctions when considering load capacities.

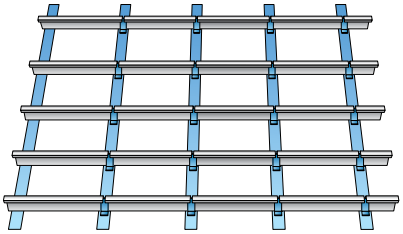
Three basic systems are given in this manual, i.e. the Sleeved System, the Butted System and the Double Span (Brick Restraint) System. A Heavy End-Bay System can be used though in practice this may be hampered by interaction with door standards, etc, and the designer will require to exercise caution if this system is used (and indeed may require to anticipate the possibilities of future alterations to the wall structure). The design disc provides a method of load assessment for this system.



SLEEVED SYSTEM

This is a system of single bay length sections with sleeves at penultimate supports and at alternative internal supports. Minimum number of spans is 2 and the maximum span is 12.5 metres.

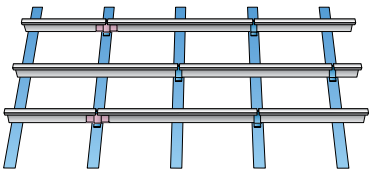
DETAILS ON PAGE 45
LOAD TABLES ON PAGE 39



BUTTED SYSTEM

This is a single span system. The system is required for single bay length rails and is efficient for short spans or light wind loadings. Sections can be fitted running past the supports or may be within the depth of supporting sections. Maximum span is 11.4 metres.

DETAILS ON PAGE 45
LOAD TABLES ON PAGE 41



DOUBLE SPAN SYSTEM (BRICK RESTRAINT)

This is a relatively stiff system intended for use as brickwork restraints, or as window framing. Minimum number of spans is 2 and maximum transport length of section is 15 metres thus maximum span is 7.5 metres. Use double-span sections for the full length if the wall has an even number of bays and use a triple-span rail, ie double-span plus a sleeve, if an odd number of bays. Section thickness may require to increase for the triple-span case to compensate for the reduced stiffness, when compared with the double span system.

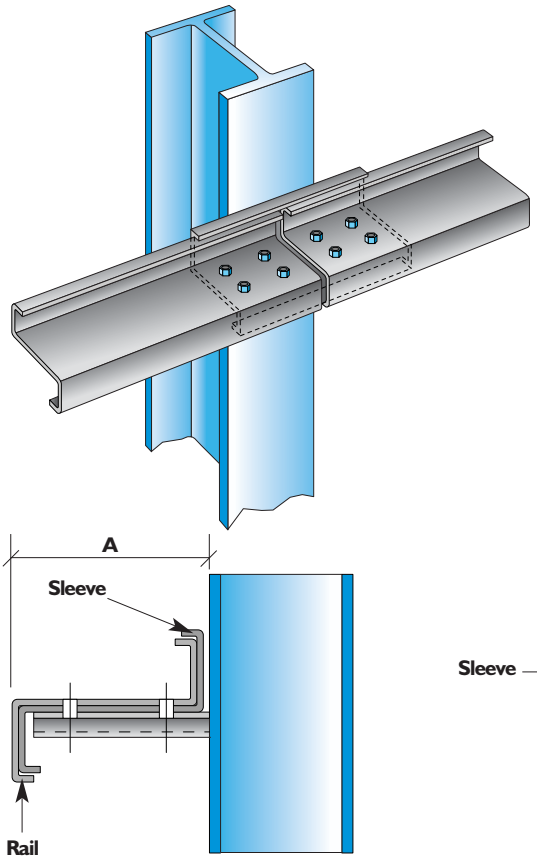
DETAILS ON PAGE 45
LOAD TABLES ON PAGE 43

DESIGN DISK ALLOWS FOR VARIATION IN DEFLECTION

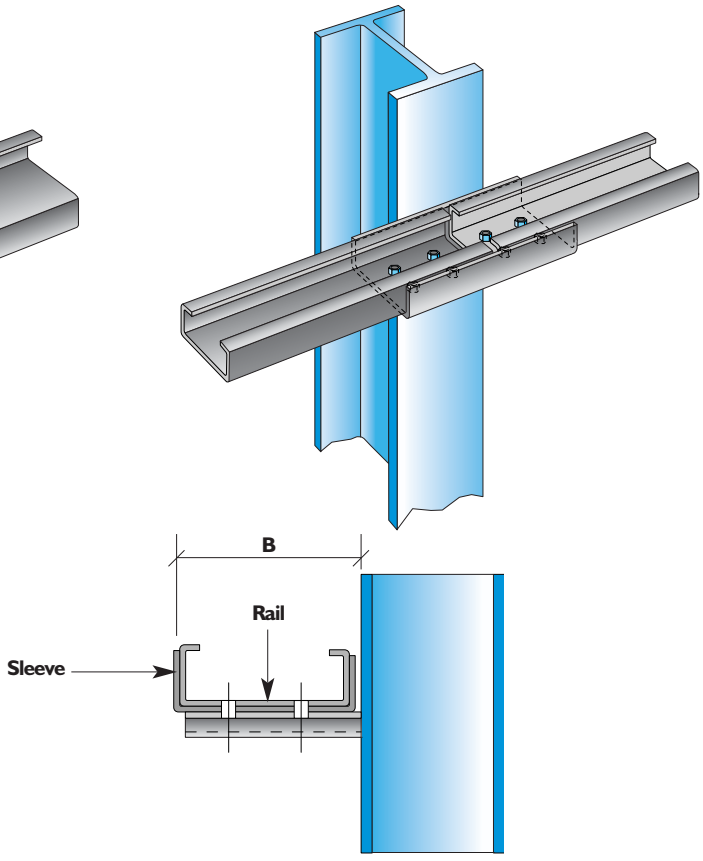
SLEEVED RAIL SYSTEM

Typical connections are illustrated for sleeved joints for both Zed and Cee Sections.

Note that the sleeves for the Zed System may be the same thickness as the rail section but sleeves for the Cee System are provided in one standard thickness for each rail depth.

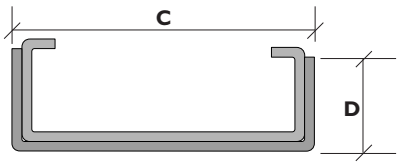


ZED RAILS



CEE RAILS

ZED RAIL FLANGE TO THE CLADDING MUST TOE UPHILL FOR FIBRE-CEMENT, HOOK BOLT FIXED



SECTION AT SLEEVED CEE SECTION RAIL

Rail Depth	Dimension A	Dimension B	Dimension C	Dimension D	Thickness for Cee Sleeve
140	148	147	146	60	2.0
170	178	177	177	60	2.5
200	208	207	207	70	2.5
240	248	247	248	70	3.0
300	308	307	308	90	3.0

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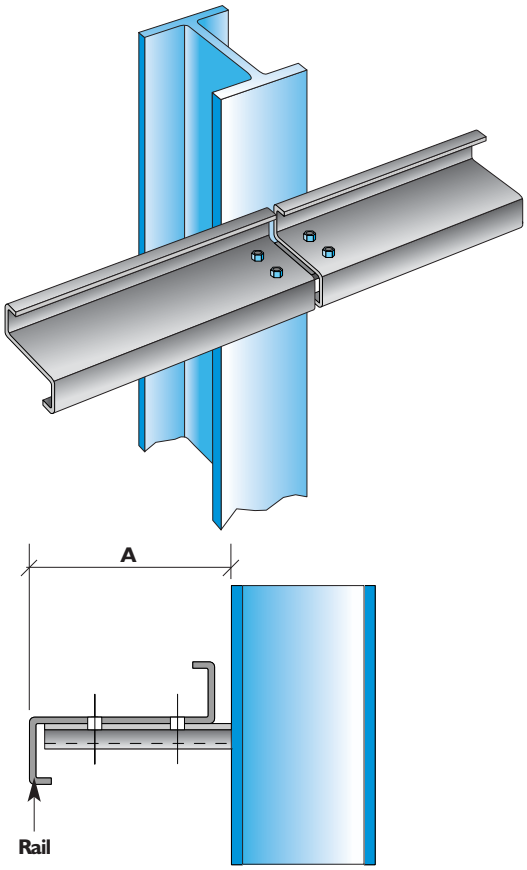
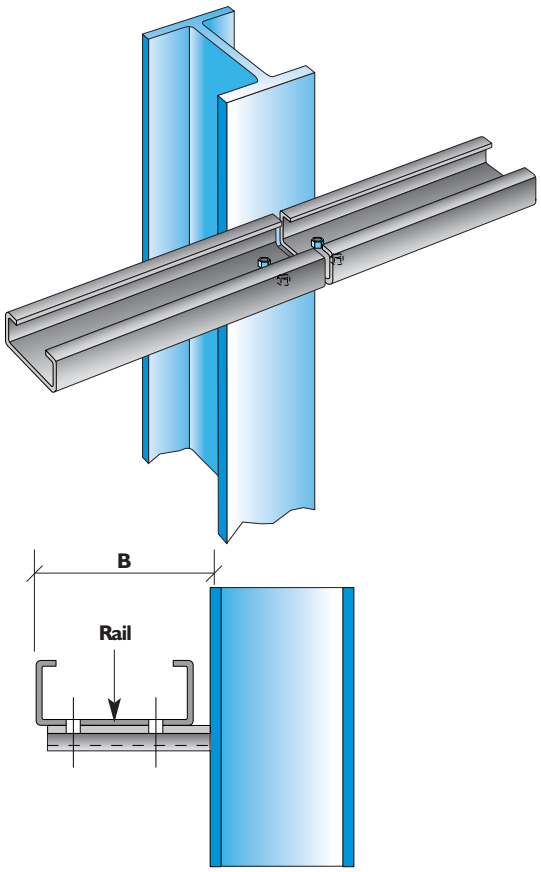
BUTTED & DOUBLE SPAN RAIL SYSTEM

The connections for these two systems are identical except that the Butted System has a butted connection at every frame and the double-span system has a butted joint at alternative connections and is continuous over intermediate supports.



ZED RAILS

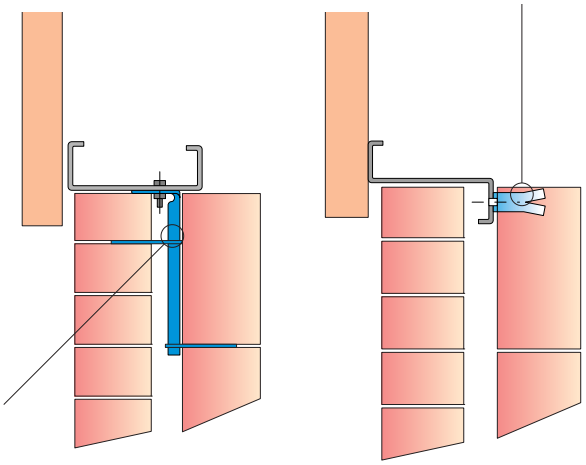


CEE RAILS

TYPICAL BRICK RESTRAINT DETAILS

Typical details are indicated for illustration. The brickwork designer is responsible for design of the blockwork to rail connections and should select rails on the basis of a suitable deflection limit. A deflection limit of span/300 is commonly employed and the design program defaults to that limit for double span systems. The user may alter this as required.

STEEL TIE FIXING
Proprietary steel straps fixed to Engineers requirements



STEEL STRAP FIXING
Steel straps and ties to Engineers requirements

SHEETING RAIL SAG-SYSTEM REQUIREMENTS

The user should note that it is assumed in the development of details and load tables that wall claddings will provide a diaphragm action and will be positively fixed to the rails, thereby eliminating vertical bending in the rails. Any claddings which do not meet these criteria should be referred to Steadmans, or the program may be used with the cladding weight included.

The number of rows of sags members for normal use is provided in the table, shown below for restraining-type metal cladding and fibre-cement cladding. The table also provides limiting dimensions for a number of cases.

Less limiting conditions can be applied for support of restraining type metal cladding, in certain cases. Where the cladding weight can be carried by floors, brick wall heads or eaves beams or by diaphragm action, and where the reduced wind load capacity is acceptable then 0 rows of sag bars may be adopted up to a 6.3m span, and a single row may be used up to a 7.6m span. In the case of 0 rows being adopted then temporary supports may be required to prevent sag in the rails during erection.

The usual system of rail restraints comprises the use of 45 x 45 x 2 angle section rail struts, with diagonal ties, as indicated on the next page.

Limiting Dimensions for normal conditions.

Cladding Type	Case	Number of rows of Sag members			
		0	1	2	3
Restraining type metal cladding	Maximum span for Normal Sag System	3.0m	6.3m	10.0m	12.5m
	Maximum panel height n/a /set of diagonal braces	10.0m	10.0m	7.5m	
Fibre-cement cladding	Maximum span	2.4m	5.1m	7.6m	10.0m
	Maximum panel height n/a /set of diagonal braces	7.0m	7.0m	6.0m	

Additional Notes

1. **In the case of multiple rows of rails the maximum number of rails per set of diagonals should be limited to 8.**
2. **For double-row sag systems in walls the sag members are placed at 1/3 spans for a uniform appearance. For triple row systems place sag members at 1/4 spans.**
3. **For spans in excess of 10m use heavy duty angular diagonal ties in place of tie wires.**
4. **Advice should be sought from Steadmans when supporting any special claddings, such as clip fixed, which offer less restraint and reduced diaphragm action.**
5. **Support cleats should be checked for their capacity to handle wall cladding weight where this exceeds 13kg/m2 or where flat plate cleats are used. Similarly if wall glazing or other deflection sensitive claddings are used then the designer should confirm that the cleats have adequate bending resistance and consideration should be given to using heavy duty angular diagonal ties in such conditions.**

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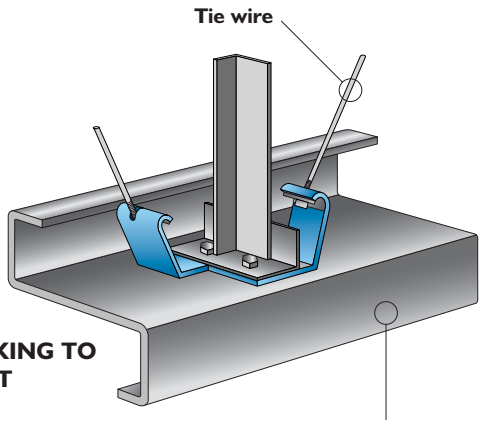
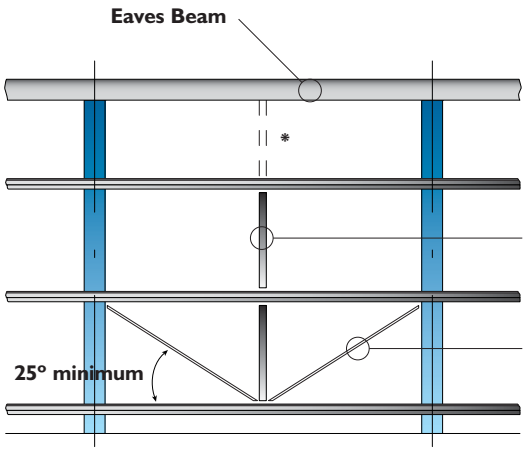
SHEETING RAIL SAG SYSTEMS

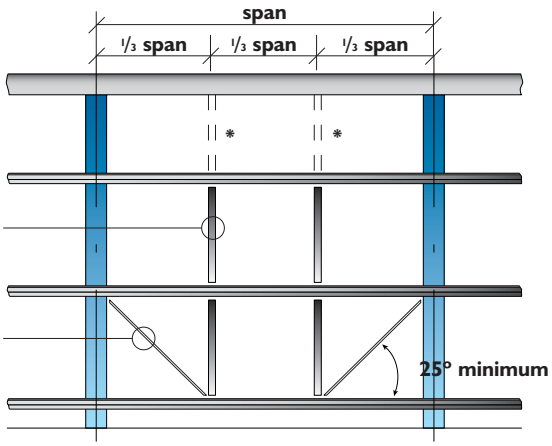
* Note that for restraining type metal cladding up to 10m high the diagonal ties may be removed if the rail struts are taken up and securely fixed to the underside of the eaves beam, provided the eaves beam is designed to carry its tributary weight of wall panel. The fixing to the eaves beam should incorporate a stiffening cleat for wall heights greater than 4m, or with heavy claddings. (See Eaves Beam section for details.)



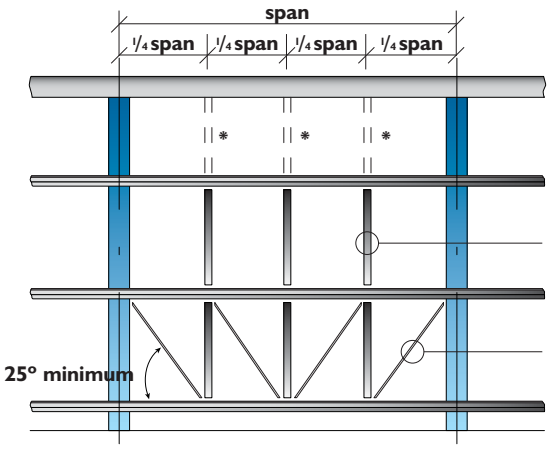
DIAGONAL TIE FIXING TO RAIL STRUT



SINGLE ROW STRUT SYSTEM



DOUBLE ROW STRUT SYSTEM



TRIPLE ROW STRUT SYSTEM

DIAGONAL TIES SHOULD BE ANCHORED TO THE CLEAT BOLTS NEAREST

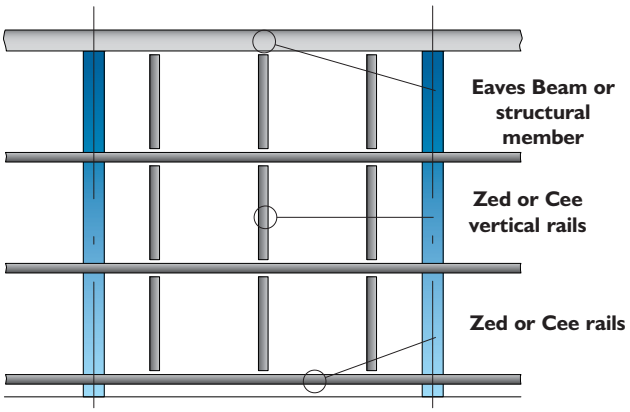
HORIZONTAL WALL CLADDING REQUIREMENTS

Horizontal cladding is often used in conjunction with cold rolled rail systems. Some examples are provided to assist the designer in deciding suitable cladding support.
In all cases the eaves beam or structural top member should be checked for horizontal wind loading, in addition to any vertical loading.

TYPE 1

Eaves Beam designed for wall cladding weight.

The number and position of vertical rails will depend on cladding requirements. Horizontal rails should generally be selected as for vertical claddings, but load capacity may require to be reduced when the spacing between vertical rails exceeds 2 metres. (Refer to Steadmans.)

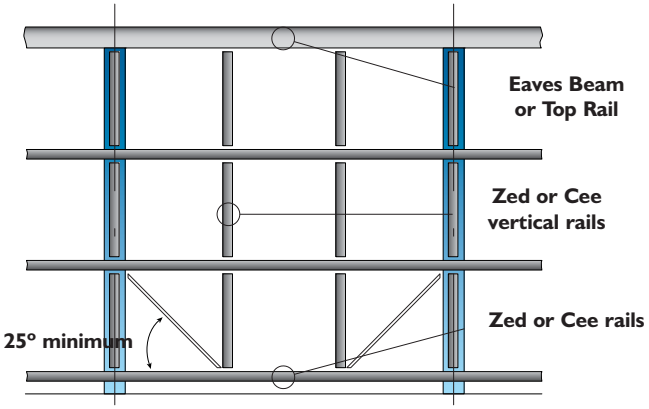


TYPE 1

TYPE 2

Eaves member not designed to carry wall cladding weight.

Horizontal rails should be selected as above.
The minimum number of sets of diagonal ties should be as given in the table on page 21. Vertical rails should be spaced to suit the cladding but should also satisfy the minimum angle shown for diagonal ties. Load capacity for horizontal rails may require to be reduced when the spacing between vertical rails exceeds 2 metres, as noted above. Support cleats should be checked for their capacity to handle wall cladding weight where this exceeds 13kg/m2 or where flat plate cleats are used.

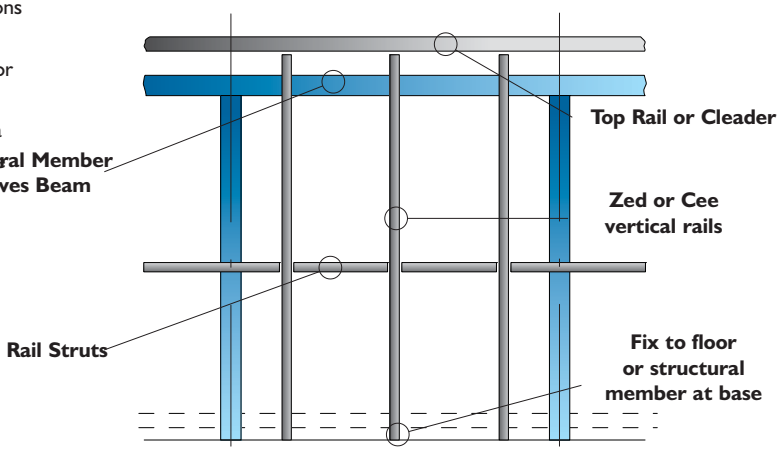


TYPE 2

TYPE 3

Vertical Rail System.

Vertical rails should be selected as for a Butted rail system of the same span as the vertical distance between top and bottom supports. Use horizontal struts at the minimum number of locations as recommended for sag members for the same span. The top member may be a structural section or eaves beam depending on the nature of construction. The base of the posts may be fixed to the floor or a structural section can be used. Top and bottom members must be designed for horizontal wind loading as dictated by the construction details.



TYPE 3

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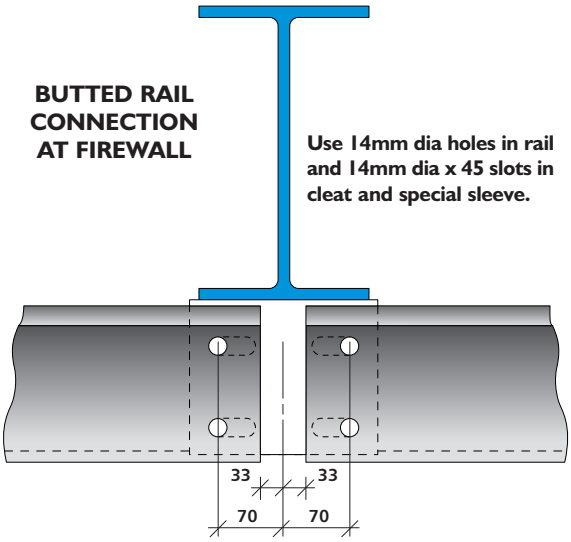
FIRE RATED BOUNDARY WALLS

Under boundary conditions it is required to provide walls with a fire rating. In these cases the fire rating is provided by the wall cladding and insulation, which are taken to be independent of the rail system in a fire situation. However, rails are required to have slotted end-holings to reduce buckling due to the significant thermal expansion during fire conditions. Connections utilise combustible washers as indicated, to facilitate these thermal movements, whilst providing for normal rail performance during non-fire conditions. (Some approving authorities also require that the eaves beam be fire protected.)

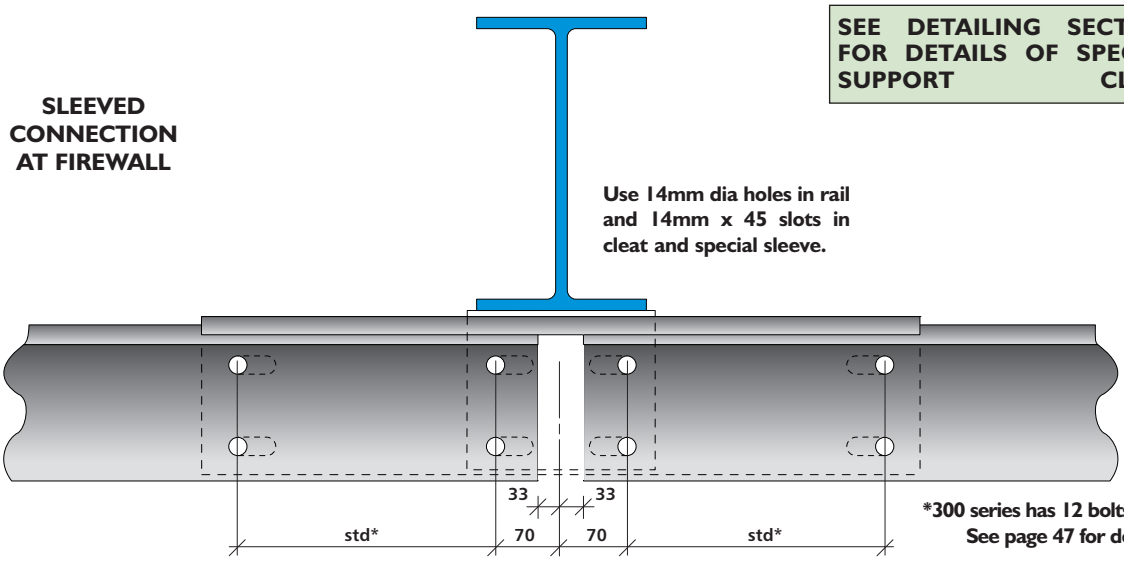
The Steadmans fire rail system has been developed to provide a suitable facility for expansion through slotted holes on the sleeves and cleats. Thus, the system can be used for sleeved and butted rails without limiting the joint positions, provided the slotted cleats and sleeves are adopted, all as indicated here and in the detailing section. The system may be used for spans up to 10m.

BUTTED RAIL CONNECTION AT FIREWALL



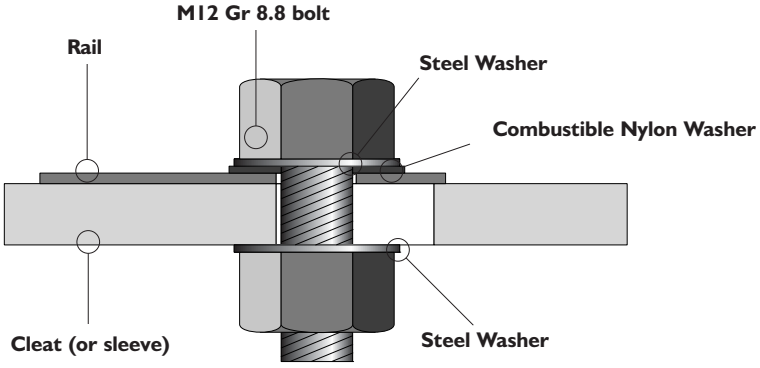
SEE DETAILING SECTION FOR DETAILS OF SPECIAL SUPPORT CLEAT

SLEEVED CONNECTION AT FIREWALL



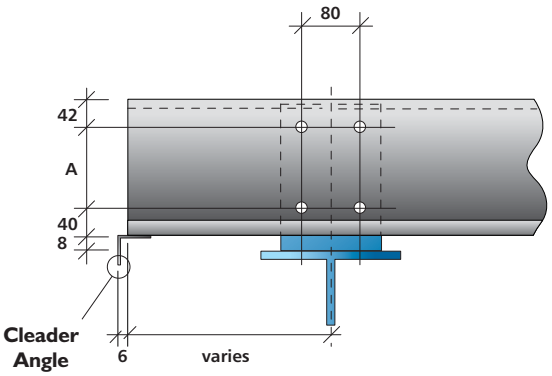
*300 series has 12 bolts in sleeve
See page 47 for details

Details are shown here for zed rails but they apply equally to Cee section rails. See page 47 for detailing information.

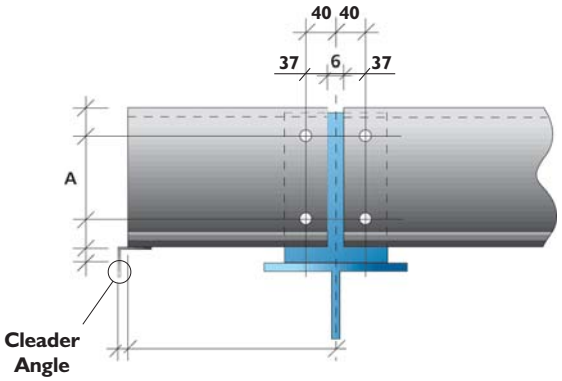


ENLARGED BOLT DETAIL SHOWING COMBUSTIBLE PLASTIC WASHER

TYPICAL ZED SECTION DETAILS (CEE SECTIONS SIMILAR)

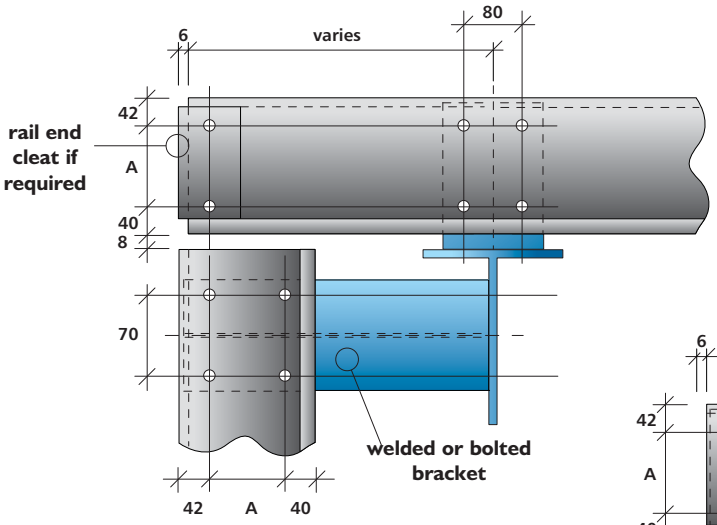


Gable Purlin Detail

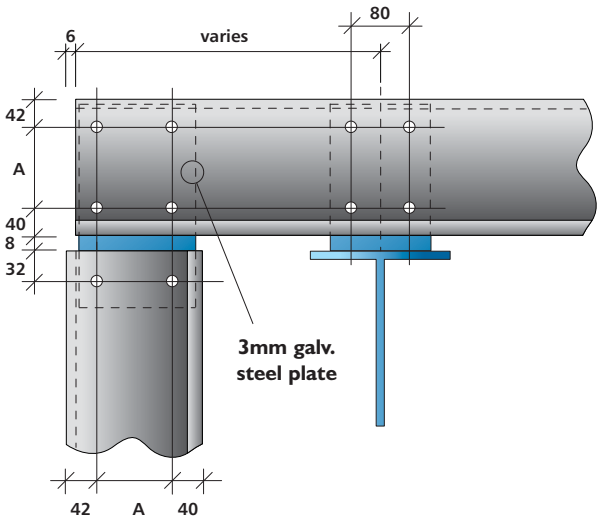


(not to exceed 3 x section depth)

Alternative Gable Purlin Detail
(or can use a sleeve at extendable gable)



Corner Rail Connections



Alternative Corner Rail Connection

Dimensions in mm

Depth	A
140	58
170	88
200	118
240	158
300	218

PARAPET FRAMING

Steadmans produce a variety of zeds and cees which can provide a flexible range of solutions to parapet framing.

Parapet posts may be fabricated from standard Cee sections bolted together to form double-cees at rail positions and at centres not exceeding 1500mm.
(Use the thickest section available for the post depth used, to assist with absorbing bolt tension at the connection.)

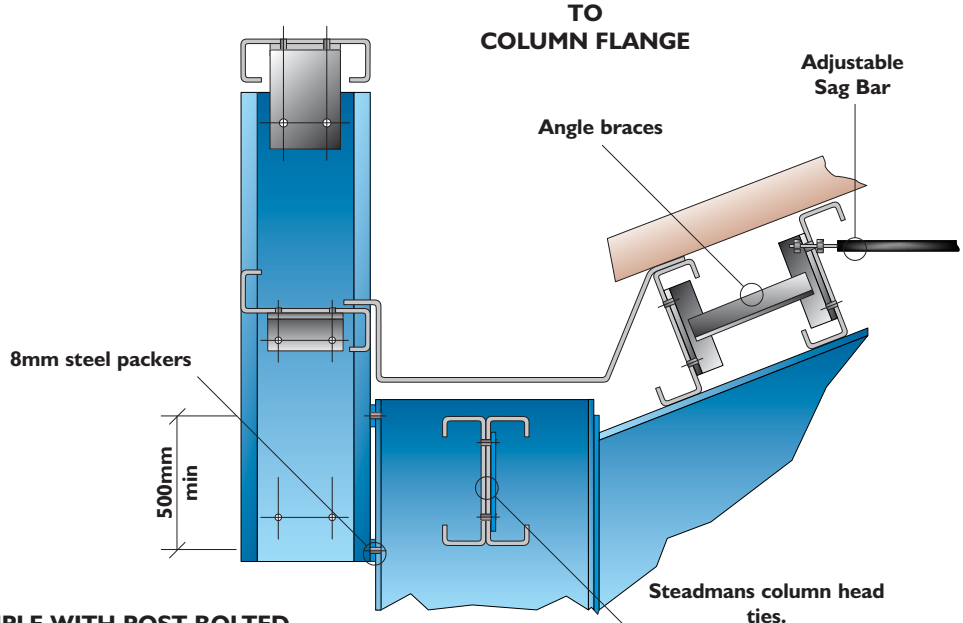
Use posts of same depth as rails for flush and convenient connections.

Posts may be bolted to columns via 8mm packer plates. Connection should be designed to suit height of parapet but height between pairs of bolts should not be less than 500mm and use backing plates at the flange when bolt tension exceeds the flange capacity.

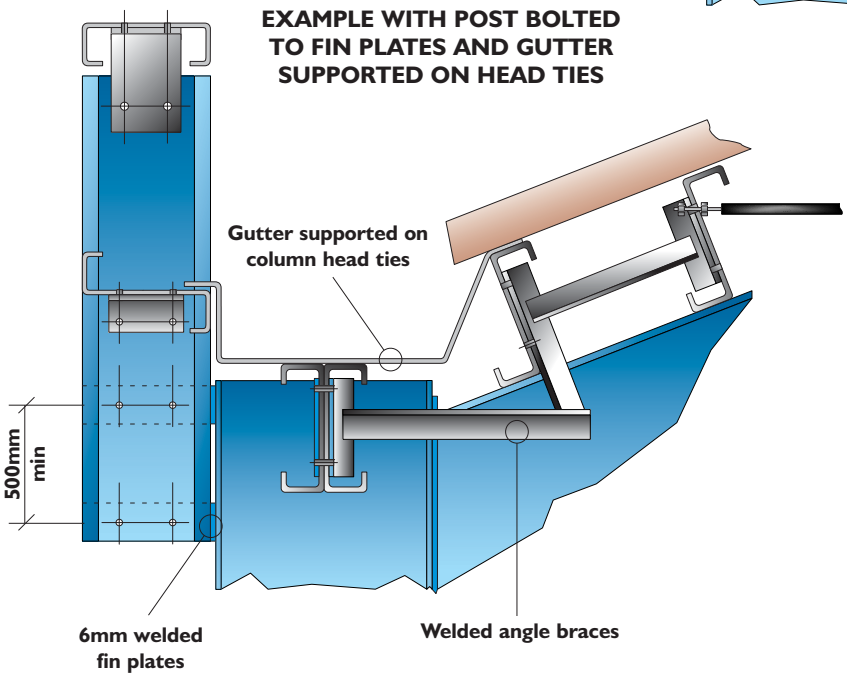
Alternatively, for higher wind loadings it may be preferred to weld 6mm fin-plates to the column flanges and to bolt the cees sections on either side.

Particular attention should be paid to wall sag systems to remove sag, when gutters are supported from the rails

EXAMPLE WITH POST BOLTED TO COLUMN FLANGE

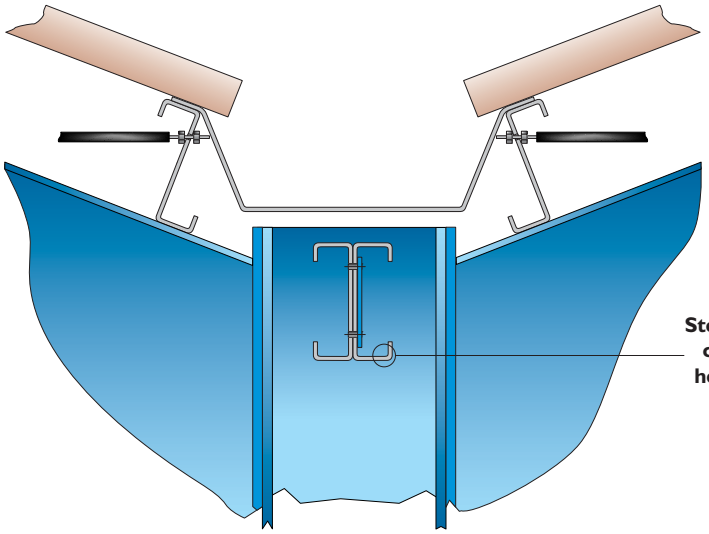


EXAMPLE WITH POST BOLTED TO FIN PLATES AND GUTTER SUPPORTED ON HEAD TIES

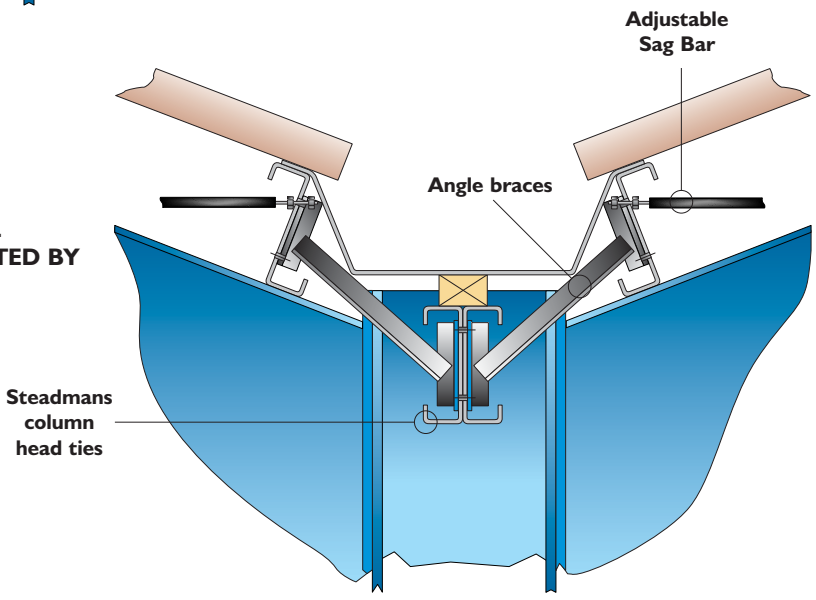


VALLEY BEAM DETAILS

Cold rolled cees in back-to-back configuration are commonly adopted for support of valley gutters and/or valley column ties. Cees should be bolted together in pairs on the standard gauge lines at ends and at centres not exceeding 1500mm. Section properties of selected double-Cee beams are provided to assist with design. Design should be carried out to BS5950: Part 5 or by reference to Steadmans.



HEAD TIE DETAIL WITH NO GUTTER SUPPORT



HEAD TIE DETAIL WITH GUTTER SUPPORTED BY HEAD TIES

Section properties for selected Double-Cee Sections.

Section	Weight(kg/m)	Sxe(cm^3)	Ixx(cm^4)	Ryy(mm)	Rxx(mm)	Mc(kNm)
2@C170/18	8.94	59.16	508	29.6	66.8	18.86
2@C200/18	10.06	76.58	778	30.8	77.9	24.26
2@C240/20	12.78	114.22	1384	31.8	92.2	35.48
2@C300/25	20.00	224.10	3405	40.1	116.0	69.50
2@C300/30	23.94	268.90	4046	40.0	115.0	88.48

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DOOR AND WINDOW FRAMING

Cee Sections are particularly suited for trimming door and window frames.

Counterformed holes are available as an option, though the use of timber packers at windows and door frames are recommended in order to take up tolerances and slight misalignments and in these cases normal or thin-head bolts may be simpler and more economical.

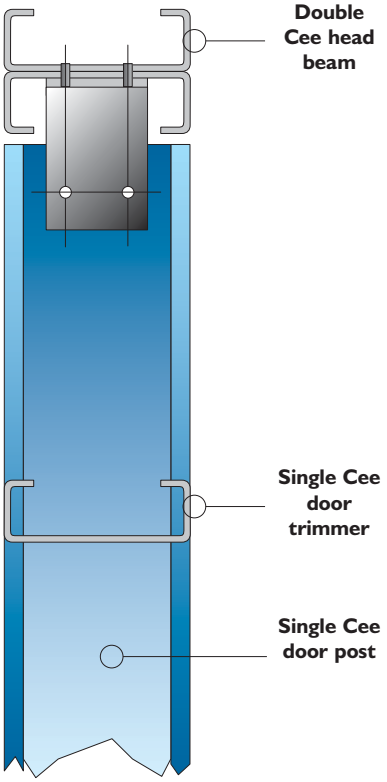
If cold rolled sections are used as framing for overhead doors, then:

a) **Check that eaves beam can carry any horizontal wind forces, add eaves braces or a double-Cee head section, as required.**

b) **Confirm with door supplier that the thin section can carry local forces from the springs and rollers.**

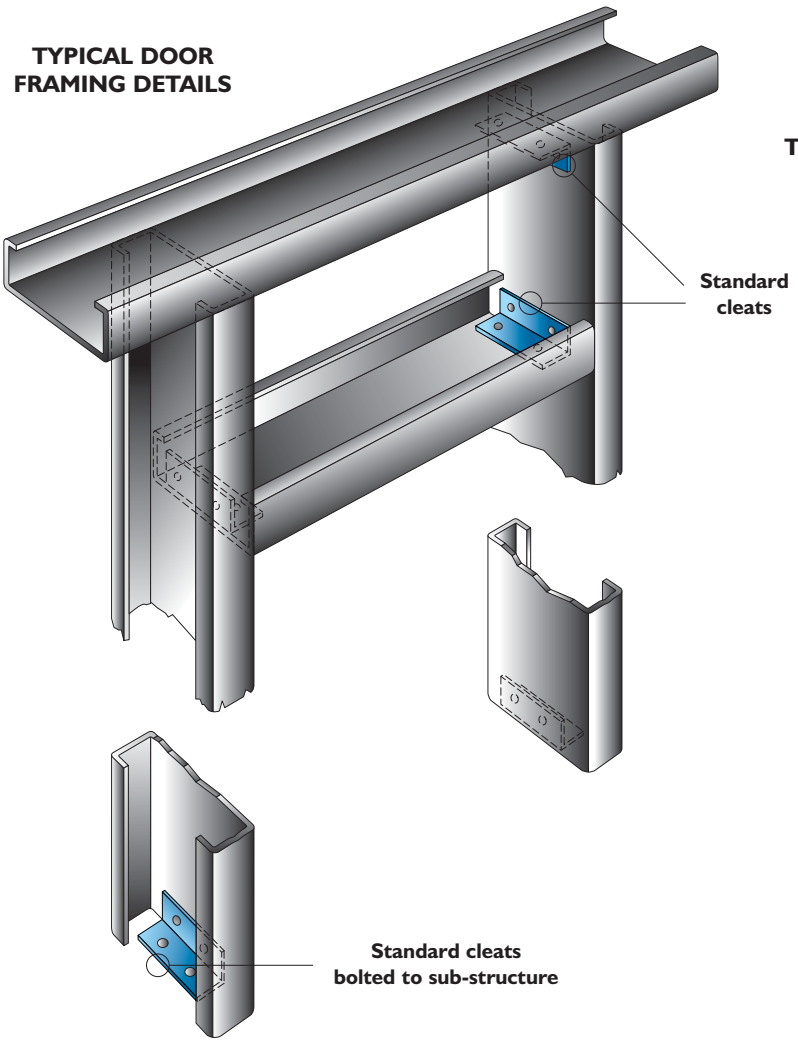
c) **Use maximum available thickness for section depth utilised.**

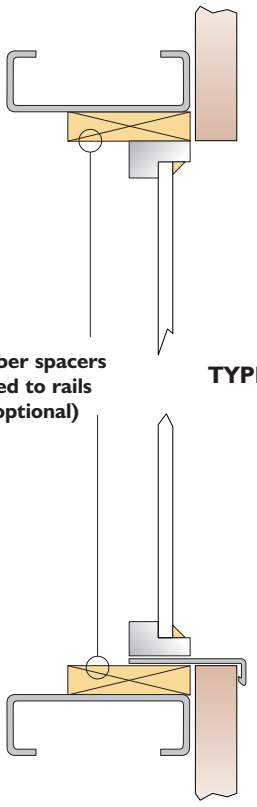
d) **If impact damage is likely then add bollards to protect steelwork and cladding.**



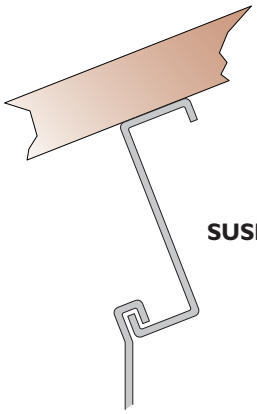
SECTION THROUGH TYPICAL OVERHEAD DOOR

TYPICAL DOOR FRAMING DETAILS

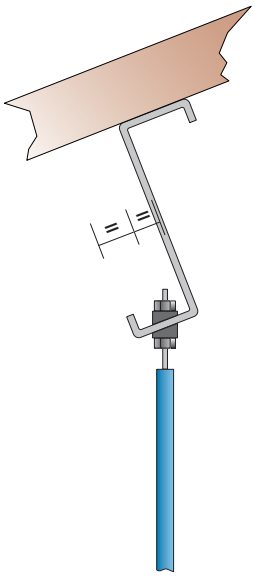




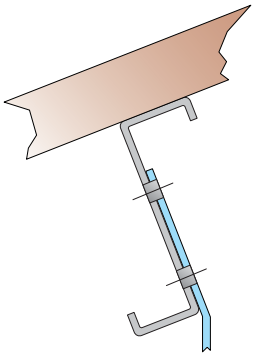
TYPICAL WINDOW SECTION



CASE A - LOAD SUSPENDED FROM PURLIN LIP



CASE B - LOAD SUSPENDED FROM BOTTOM FLANGE OR WEB LINE



SUSPENDED SERVICES & POINT LOADS

Services are commonly suspended from the purlins, such loads varying in nature and magnitude. This section gives guidance as to accommodation of the point loadings involved.

The table below gives the maximum single point load (unfactored) value for typical light loading applications. For use of this table three conditions must be satisfied;

(i) Load centres to be not less than 500mm,

(ii) Purlin must be selected for a total UDL not less than the sum of the dead load + imposed load + a service load not less than the UDL value which would give the same mid span BM as the point loads on a simple beam of the same span,

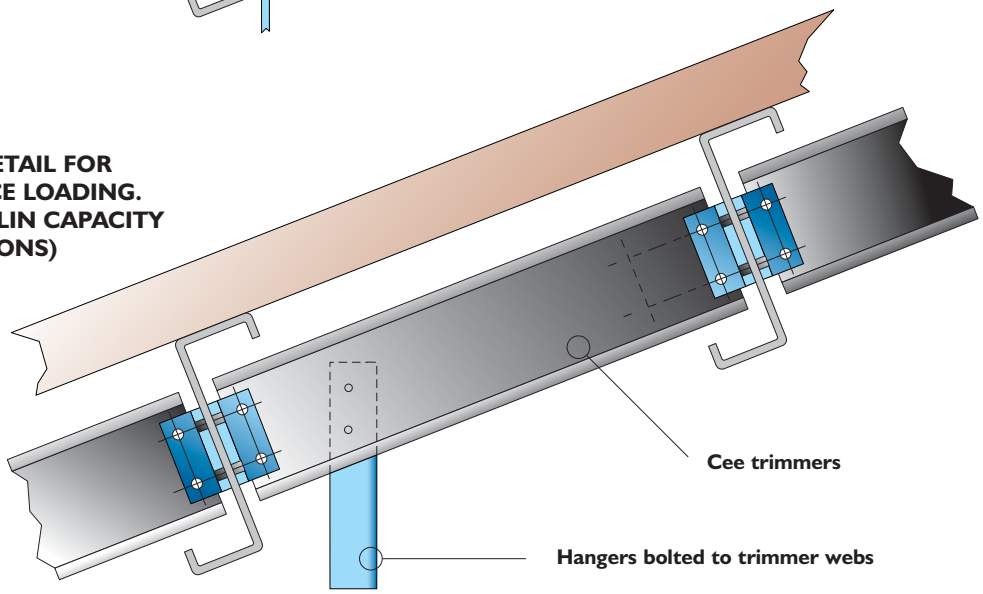
(iii) If roof slope exceeds 12 degrees then reduce allowable load linearly to a value of 50% the tabulated value, at a maximum slope of 25 degrees.

For heavier point loadings a steel framework should be adopted as shown below. Maximum point loads applied to the purlin for this system should be determined in agreement with Steadmans.

MAXIMUM VALUE FOR POINT LOADS FOR LOADING CASES A AND B

Thickness	Type 'A'	Type 'B'
1.4 - 1.6	10kg	20kg
1.8 - 2.0	15kg	30kg
2.5 - 3.0	20kg	40kg

TRIMMING DETAIL FOR HEAVIER SERVICE LOADING. (SUBJECT TO PURLIN CAPACITY LIMITATIONS)



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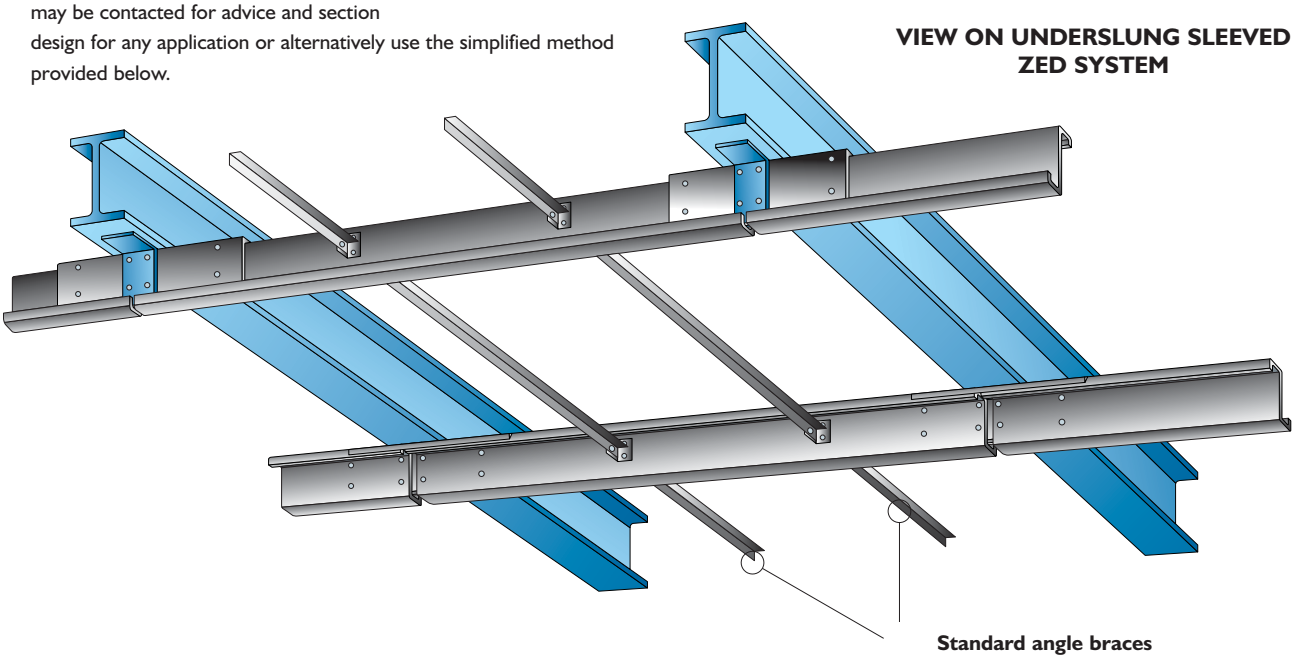
SUSPENDED CEILINGS.

Cold rolled sections are increasingly being used as suspended ceiling supports. Support may be provided by either zeds or cees, provided that sections are properly restrained against twisting and buckling. Sections may be used over or under supports depending on individual circumstances.

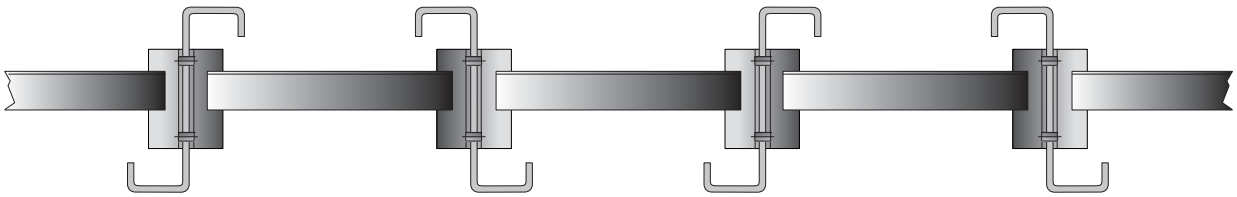
Typical details are provided for illustration purposes. Steadmans may be contacted for advice and section design for any application or alternatively use the simplified method provided below.

VIEW ON UNDERSLUNG SLEEVED ZED SYSTEM



Standard angle braces

TYPICAL SECTION THROUGH ZEDS SHOWING ALTERNATE DIRECTIONS OF SECTIONS



Notes:

i) Torsional and lateral restraint should be applied at supports (cleats) and at mid-span for spans up to 6.1m and at third spans for spans up to 10m. Such restraints should be tied back to a suitable anchorage to prevent lateral movement of the support grid.

ii) Select sections of a suitable stiffness to provide a deflection not exceeding the limits provided by the ceiling supplier (usually span/240 to span/360).

iii) Zeds may be single spanning or may be sleeved, if details suit. Cees are generally used as single spanning sections.

iv) Whether zeds or cees are used they should be used in opposing pairs, as illustrated, to minimise any twisting effects.

v) Sections may be selected from the load tables in the normal way but the tabulated gravity load capacities should be reduced by 50% to allow for the reduced restraint. (No reduction required for deflection controlled values.)

Alternatively, use the design program with "non-restraining" cladding.

Load Tables

INTRODUCTION.

This manual presents load tables for a number of practical design situations.

Tables should be read in conjunction with the systems information as given earlier in this manual.

Steadmans have used a flexible approach to the number of rows of sag members, to allow maximum freedom of choice for the designer and Architect. Information on this topic should be obtained from the relevant section of the manual prior to selection of purlins and rails.

Note that if zero rows of sag bars are used then temporary bracing may be required during erection to avoid distortion of purlins and rails.

Load tables are based on calculations to BS 5950: Part 5: 1998 using a combination of rational analysis and component testing on sleeve connections.

The tables are based on the use of restraining metal cladding. For the cases of non-restraining cladding and hook-bolt fixed cladding the design disk should be used in conjunction with the sag systems as provided earlier in this manual.

PURLIN LOAD TABLES

Load tables provide unfactored gravity load capacities which are based on the lesser of the purlin working load capacity or as controlled by a deflection limit of Span/180. The tables also provide ultimate load capacities for gravity load, wind uplift and for deflection limits of Span/180 and Span/150. Wind uplift capacity values are given for three conditions, i.e. 0 rows, 1 row and 2 rows of purlin braces, within the limits of the information provided in this manual. (Refer to page 8)

When evaluating factored and unfactored loadings the self weight of the purlin section need not be considered as this effect is included in the load tables, with the exception that the deflection-controlled values are based on deflections only, excluding self weight effects, so that other limits may be adopted by pro-rata.

Purlins are frequently selected on the basis of a gravity load deflection limit of Span/180 but there may be a number of cases, including agricultural buildings, where other limits may apply. In the case of agricultural buildings the designer may choose to select purlins on the basis of the load given for the Span/150 limit, for unfactored loads, and on the basis of the ultimate capacity for factored loadings. Some claddings may require more stringent deflection limits and these may be determined by pro-rata. It is not usual to limit deflections for wind uplift cases but if required the designer can evaluate the unfactored net wind uplift and limit to the deflection-limit capacity given in the tables. Note that purlin design may be more readily carried out using the Steadmans design software.

Wind loadings should be evaluated to the relevant code of practice and should be increased by a suitable load factor (usually 1.4), with the cladding dead load deducted to give the factored net loading.

The load tables apply to roof slopes up to 25 degrees, for steeper slopes the design software should be used or consult Steadmans direct.

SHEETING RAIL LOAD TABLES

Sheeting rail tables are based on the usual assumption that cladding dead weight does not cause significant bending in the vertical plane. This condition is satisfied in practice if the cladding weight is supported by the eaves beam or at the base of the panel or if the cladding is fixed in such a manner as to form an effective diaphragm. (Refer to BS 5950: Part 5.) Should the designer consider that the wall cladding weight should be carried by the rails (prudent for heavy claddings) then the design program can be used with this option selected.

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A specific table of values is given for brickwork restraints, with values provided for single, two-span and three-span conditions to allow the designer a wide variety of solutions. Loads are provided based on capacity and for the commonly used deflection limit of span/300. They are based on the assumption that the brick ties provide full restraint to the rails and if this is not the case advice should be sought from Steadmans. Use the lesser value of capacity and deflection limit in design.
If an alternative deflection limit is required this can be selected by pro-rata. Alternatively the design program may be used with a suitable deflection limit selected.

EAVES BEAM LOAD TABLES

Tables are provided for eaves beams for single and double span cases within the limits of the product. The tables are based on the assumption of restraining type roof cladding. It is assumed that horizontal wind forces are carried by the eaves beam and braces and hence into the roof diaphragm. The designer should be satisfied that suitable load paths exist for these forces. For cases where the wall cladding is fixed near the top flange of the eaves beam then the designer may wish to consider that the horizontal wind is carried by the fixings directly into the roof diaphragm, provided restraining type roof cladding is used.

NON UNIFORM SPANS

The most economical design of frames and cold-rolled sections occurs when all spans are of equal length. However there are circumstances where it is not possible to achieve this due to practical constraints. This section gives an indication of how to deal with non-uniform design cases, based on guidance in BS 5950: Part 5.

CASE 1

Spans not varying by more than 20% of the maximum span.

a) Sleeved or Heavy End-Bay System.

In this case select sections and sleeves on the basis that all spans are assumed to equal the maximum span.

b) Butted system.

Select a section for each span individually, or for the maximum span. Note that it is usual to maintain the same depth of section for all spans so that the same cleats are used throughout, though this is not mandatory provided detailing is suitably adapted.

CASE 2

Spans not complying with case 1, but within specific limits.

a) Sleeved or Heavy End-Bay system.

Split the run of sections into a number of sets of spans where the variation in each set is not more than 20% of the largest span in that set and choose section thickness on the basis of the largest span in each set, i.e. treat each set of spans as a case 1 situation.

b) Butted System.

This may be used without limitation.

CASE 3

Spans not complying with the limits of case 1 nor case 2.

In this case, either use butted sections throughout the structure or contact Steadmans for specific advice.

SLEEVED PURLINS

Span	Section	Weight (kg/m)	Allowable Working Loads for Gravity Case								Ultimate loads in kN (purlin SW incl)			
			Total	Deflection controlled		Allowable Values in kN/m2(with defl=L/180 max)					Gravity	Uplift	Uplift	Uplift
			Load (kN)	Span/ 150	Span/ 180	1200 mm	1400 mm	1600 mm	1800 mm	2000 mm	Down	0 rows	1 row	2 rows
3.5	140/14	3.06	11.11	17.93	14.94	2.64	2.27	1.98	1.76	1.59	17.77	14.44	18.02	
	140/16	3.48	13.22	20.34	16.95	3.15	2.70	2.36	2.10	1.89	21.15	17.17	21.43	
	170/15	3.62	14.91	30.15	25.12	3.55	3.04	2.66	2.37	2.13	23.85	19.34	24.15	
4.0	140/14	3.06	9.69	13.73	11.44	2.02	1.73	1.51	1.35	1.21	15.51	12.66	15.80	
	140/16	3.48	11.54	15.58	12.98	2.40	2.06	1.80	1.60	1.44	18.46	15.06	18.79	
	170/15	3.62	13.01	23.08	19.23	2.71	2.32	2.03	1.81	1.63	20.82	16.96	21.16	
	170/16	3.86	14.27	24.54	20.45	2.97	2.55	2.23	1.98	1.78	22.83	18.59	23.20	
	170/18	4.33	16.69	27.43	22.86	3.48	2.98	2.61	2.32	2.09	26.70	21.72	27.11	
4.5	140/14	3.06	8.59	10.85	9.04	1.59	1.36	1.19	1.06	0.95	13.75	11.20	14.07	
	140/16	3.48	10.10	12.31	10.26	1.87	1.60	1.40	1.25	1.12	16.36	12.68	16.73	
	170/15	3.62	11.54	18.24	15.20	2.14	1.83	1.60	1.42	1.28	18.46	14.46	18.85	
	170/16	3.86	12.65	19.39	16.16	2.34	2.01	1.76	1.56	1.41	20.25	15.46	20.65	
	170/18	4.33	14.80	21.67	18.06	2.74	2.35	2.06	1.83	1.64	23.68	17.34	24.14	
	200/16	4.48	16.01	31.34	26.12	2.96	2.54	2.22	1.98	1.78	25.61	20.91	26.09	
5.0	140/14	3.06	7.17	8.79	7.32	1.20	1.02	0.90	0.80	0.72	12.33	8.65	12.69	
	140/16	3.48	8.14	9.97	8.31	1.36	1.16	1.02	0.90	0.81	14.68	9.79	15.09	
	170/15	3.62	10.36	14.77	12.31	1.73	1.48	1.29	1.15	1.04	16.57	11.08	17.00	
	170/16	3.86	11.36	15.71	13.09	1.89	1.62	1.42	1.26	1.14	18.17	11.84	18.63	
	170/18	4.33	13.28	17.55	14.63	2.21	1.90	1.66	1.48	1.33	21.25	13.28	21.76	
	200/16	4.48	14.37	25.39	21.16	2.39	2.05	1.80	1.60	1.44	22.99	18.86	23.52	
5.5	140/14	3.06	5.89	7.26	6.05	0.89	0.76	0.67	0.59	0.54	11.17	6.74	11.57	
	140/16	3.48	6.68	8.24	6.87	1.01	0.87	0.76	0.67	0.61	13.30	7.65	13.75	
	170/15	3.62	9.38	12.21	10.17	1.42	1.22	1.07	0.95	0.85	15.02	8.61	15.48	
	170/16	3.86	10.29	12.98	10.82	1.56	1.34	1.17	1.04	0.94	16.47	9.20	16.97	
	170/18	4.33	11.86	14.51	12.09	1.80	1.54	1.35	1.20	1.08	19.27	10.33	19.83	
	200/16	4.48	13.03	20.98	17.48	1.97	1.69	1.48	1.32	1.18	20.84	15.46	21.42	
	200/18	5.03	15.56	23.47	19.56	2.36	2.02	1.77	1.57	1.41	24.89	17.48	25.54	
	200/20	5.58	18.04	25.93	21.61	2.73	2.34	2.05	1.82	1.64	28.87	19.47	29.59	
6.0	140/14	3.06	4.90	6.10	5.08	0.68	0.58	0.51	0.45	0.41	10.20	5.35	10.63	
	140/16	3.48	5.56	6.92	5.77	0.77	0.66	0.58	0.52	0.46	12.15	6.08	12.64	
	170/15	3.62	8.34	10.26	8.55	1.16	0.99	0.87	0.77	0.69	13.72	6.81	14.23	
	170/16	3.86	8.86	10.91	9.09	1.23	1.05	0.92	0.82	0.74	15.05	7.29	15.59	
	170/18	4.33	9.90	12.19	10.16	1.38	1.18	1.03	0.92	0.83	17.60	8.19	17.85	
	200/16	4.48	11.90	17.63	14.69	1.65	1.42	1.24	1.10	0.99	19.05	12.32	19.68	
	200/18	5.03	14.22	19.72	16.44	1.97	1.69	1.48	1.32	1.18	22.75	13.93	23.46	
	200/20	5.58	16.49	21.79	18.16	2.29	1.96	1.72	1.53	1.37	26.39	15.52	27.18	
	240/18	5.77	17.51	31.76	26.47	2.43	2.08	1.82	1.62	1.46	28.02	19.59	28.83	
6.5	170/15	3.62	7.05	8.74	7.28	0.90	0.78	0.68	0.60	0.54	12.61	5.49	12.86	
	170/16	3.86	7.50	9.29	7.74	0.96	0.82	0.72	0.64	0.58	13.84	5.88	13.74	
	170/18	4.33	8.38	10.39	8.66	1.07	0.92	0.81	0.72	0.64	16.19	6.61	15.42	
	200/16	4.48	10.95	15.02	12.52	1.40	1.20	1.05	0.94	0.84	17.52	9.95	18.21	
	200/18	5.03	13.08	16.81	14.00	1.68	1.44	1.26	1.12	1.01	20.93	11.26	21.70	
	200/20	5.58	15.12	18.57	15.47	1.94	1.66	1.45	1.29	1.16	24.28	12.55	25.14	
	240/18	5.77	16.12	27.06	22.55	2.07	1.77	1.55	1.38	1.24	25.79	15.86	26.67	
	240/20	6.39	18.89	29.92	24.94	2.42	2.08	1.82	1.61	1.45	30.23	17.72	31.21	
	240/25	7.94	25.67	36.94	30.79	3.29	2.82	2.47	2.19	1.97	41.07	22.16	42.29	
	240/30	9.47	32.00	43.78	36.49	4.10	3.52	3.08	2.74	2.46	51.20	26.13	51.09	
7.0	170/15	3.62	6.03	7.54	6.28	0.72	0.62	0.54	0.48	0.43	11.66	4.51	10.97	12.26
	170/16	3.86	6.41	8.01	6.68	0.76	0.65	0.57	0.51	0.46	12.80	4.83	11.73	13.43
	170/18	4.33	7.17	8.96	7.46	0.85	0.73	0.64	0.57	0.51	14.98	5.44	13.16	15.54
	200/16	4.48	10.13	12.95	10.79	1.21	1.03	0.90	0.80	0.72	16.21	8.15	16.95	16.95
	200/18	5.03	11.73	14.49	12.08	1.40	1.20	1.05	0.93	0.84	19.37	9.23	20.20	20.20
	200/20	5.58	12.96	16.01	13.34	1.54	1.32	1.16	1.03	0.93	22.48	10.30	22.96	23.39
	240/18	5.77	14.92	23.34	19.45	1.78	1.52	1.33	1.18	1.07	23.87	13.00	24.82	24.82
	240/20	6.39	17.49	25.80	21.50	2.08	1.78	1.56	1.39	1.25	27.98	14.53	29.04	29.04
	240/25	7.94	23.77	31.86	26.55	2.83	2.43	2.12	1.89	1.70	38.03	18.19	38.72	39.34
	240/30	9.47	29.64	37.75	31.46	3.53	3.02	2.65	2.35	2.12	47.42	21.49	45.64	47.86

SLEEVED PURLINS

Span	Section	Weight (kg/m)	Allowable Working Loads for Gravity Case								Ultimate loads in kN (purlin SW incl)			
			Total	Deflection controlled		Allowable Values in kN/m2(with defl=L/180 max)					Gravity	Uplift	Uplift	Uplift
			Load (kN)	Span/ 150	Span/ 180	1200 mm	1400 mm	1600 mm	1800 mm	2000 mm	Down	0 rows	1 row	2 rows
7.5	200/16	4.48	9.07	11.28	9.40	1.01	0.86	0.76	0.67	0.60	15.07	6.78	15.86	15.86
	200/18	5.03	10.15	12.62	10.52	1.13	0.97	0.85	0.75	0.68	18.01	7.68	18.08	18.90
	200/20	5.58	11.21	13.95	11.62	1.25	1.07	0.93	0.83	0.75	20.90	8.57	20.14	21.89
	240/18	5.77	13.88	20.33	16.94	1.54	1.32	1.16	1.03	0.93	22.20	10.80	23.22	23.22
	240/20	6.39	16.27	22.48	18.73	1.81	1.55	1.36	1.21	1.08	26.03	12.08	27.16	27.16
	240/25	7.94	22.12	27.75	23.12	2.46	2.11	1.84	1.64	1.47	35.39	15.14	34.33	36.79
	240/30	9.47	26.71	32.89	27.41	2.97	2.54	2.23	1.98	1.78	44.13	17.91	40.44	44.13
8.0	200/16	4.48	7.91	9.92	8.26	0.82	0.71	0.62	0.55	0.49	14.07		13.90	14.91
	200/18	5.03	8.85	11.09	9.25	0.92	0.79	0.69	0.61	0.55	16.82		15.72	17.77
	200/20	5.58	9.78	12.26	10.21	1.02	0.87	0.76	0.68	0.61	19.52		17.51	20.57
	240/18	5.77	12.96	17.87	14.89	1.35	1.16	1.01	0.90	0.81	20.74		21.60	21.82
	240/20	6.39	15.20	19.75	16.46	1.58	1.36	1.19	1.06	0.95	24.32		24.14	25.53
	240/25	7.94	19.70	24.39	20.32	2.05	1.76	1.54	1.37	1.23	33.07		30.18	34.48
	240/30	9.47	23.34	28.90	24.09	2.43	2.08	1.82	1.62	1.46	41.25		35.53	40.75
8.5	200/16	4.48	6.95	8.78	7.32	0.68	0.58	0.51	0.45	0.41	13.18		12.05	14.08
	200/18	5.03	7.77	9.83	8.19	0.76	0.65	0.57	0.51	0.46	15.76		13.63	16.77
	200/20	5.58	8.58	10.86	9.05	0.84	0.72	0.63	0.56	0.50	18.30		15.19	19.09
	240/18	5.77	12.15	15.83	13.19	1.19	1.02	0.89	0.79	0.71	19.44		18.88	20.59
	240/20	6.39	14.05	17.50	14.58	1.38	1.18	1.03	0.92	0.83	22.81		21.10	24.08
	240/25	7.94	17.34	21.60	18.00	1.70	1.46	1.28	1.13	1.02	31.02		26.37	31.86
	240/30	9.47	20.55	25.60	21.34	2.01	1.73	1.51	1.34	1.21	38.70		31.07	37.64
9.0	240/18	5.77	11.25	14.12	11.76	1.04	0.89	0.78	0.69	0.63	18.28		16.48	19.51
	240/20	6.39	12.44	15.61	13.01	1.15	0.99	0.86	0.77	0.69	21.45		18.41	22.81
	240/25	7.94	15.36	19.27	16.06	1.42	1.22	1.07	0.95	0.85	29.19		23.03	29.41
	240/30	9.47	18.20	22.84	19.03	1.68	1.44	1.26	1.12	1.01	36.42		27.15	34.71
	300/25	10.02	26.60	38.48	32.07	2.46	2.11	1.85	1.64	1.48	42.56		44.68	44.68
	300/30	11.97	34.45	45.73	38.10	3.19	2.73	2.39	2.13	1.91	55.11		57.03	57.65
9.5	240/18	5.77	10.02	12.67	10.56	0.88	0.75	0.66	0.59	0.53	17.24		14.41	18.53
	240/20	6.39	11.08	14.01	11.67	0.97	0.83	0.73	0.65	0.58	20.24		16.10	21.62
	240/25	7.94	13.67	17.30	14.41	1.20	1.03	0.90	0.80	0.72	27.55		20.15	27.08
	240/30	9.47	16.20	20.50	17.08	1.42	1.22	1.07	0.95	0.85	34.38		23.79	31.93
	300/25	10.02	25.12	34.54	28.78	2.20	1.89	1.65	1.47	1.32	40.18		42.43	42.43
	300/30	11.97	32.53	41.04	34.20	2.85	2.45	2.14	1.90	1.71	52.05		51.85	54.73
10.0	240/18	5.77	8.96	11.43	9.53	0.75	0.64	0.56	0.50	0.45	16.30		12.65	17.66
	240/20	6.39	9.91	12.64	10.54	0.83	0.71	0.62	0.55	0.50	19.14		14.14	19.85
	240/25	7.94	12.23	15.61	13.01	1.02	0.87	0.76	0.68	0.61	26.07		17.72	24.84
	240/30	9.47	14.49	18.50	15.42	1.21	1.03	0.91	0.80	0.72	32.53		20.94	29.27
	300/25	10.02	23.78	31.17	25.98	1.98	1.70	1.49	1.32	1.19	38.04		38.90	40.40
	300/30	11.97	29.69	37.04	30.87	2.47	2.12	1.86	1.65	1.48	49.29		46.86	52.11
10.5	300/25	10.02	22.53	28.27	23.56	1.79	1.53	1.34	1.19	1.07	36.10		35.02	38.57
	300/30	11.97	26.76	33.59	28.00	2.12	1.82	1.59	1.42	1.27	46.78		42.19	49.74
11.0	300/25	10.02	20.39	25.76	21.47	1.54	1.32	1.16	1.03	0.93	34.32		31.47	36.92
	300/30	11.97	24.22	30.61	25.51	1.83	1.57	1.38	1.22	1.10	44.49		37.92	46.78
11.5	300/25	10.02	18.51	23.57	19.64	1.34	1.15	1.01	0.89	0.80	32.69		28.29	35.41
	300/30	11.97	21.99	28.01	23.34	1.59	1.37	1.20	1.06	0.96	42.40		34.09	43.92
12.0	300/25	10.02	16.86	21.65	18.04	1.17	1.00	0.88	0.78	0.70	31.20		25.48	34.03
	300/30	11.97	20.02	25.72	21.43	1.39	1.19	1.04	0.93	0.83	40.47		30.72	41.17
12.5	300/25	10.02	15.40	19.95	16.62	1.03	0.88	0.77	0.68	0.62	29.81		23.01	31.93
	300/30	11.97	18.29	23.70	19.75	1.22	1.04	0.91	0.81	0.73	38.69		27.76	38.50

Load Tables

BUTTED PURLINS

Span	Section	Weight (kg/m)	Allowable Working Loads for Gravity Case								Ultimate loads in kN (purlin SW incl)			
			Total	Deflection controlled		Allowable Values in kN/m2(with defl=L/180 max)					Gravity	Uplift	Uplift	Uplift
			Load (kN)	Span/ 150	Span/ 180	1200 mm	1400 mm	1600 mm	1800 mm	2000 mm	Down	0 rows	1 row	2 rows
3.5	140/14	3.06	8.00	10.76	8.97	1.90	1.63	1.43	1.27	1.14	12.79	10.46	13.04	
	140/16	3.48	9.52	12.21	10.18	2.27	1.94	1.70	1.51	1.36	15.22	12.43	15.51	
	170/15	3.62	10.89	18.10	15.08	2.59	2.22	1.94	1.73	1.56	17.42	14.20	17.72	
4.0	140/14	3.06	6.75	8.24	6.87	1.41	1.21	1.05	0.94	0.84	11.15	9.18	11.44	
	140/16	3.48	7.66	9.35	7.79	1.60	1.37	1.20	1.06	0.96	13.28	10.91	13.60	
	170/15	3.62	9.50	13.86	11.55	1.98	1.70	1.48	1.32	1.19	15.19	12.46	15.53	
	170/16	3.86	10.34	14.73	12.28	2.15	1.85	1.62	1.44	1.29	16.54	13.56	16.91	
	170/18	4.33	12.01	16.47	13.72	2.50	2.14	1.88	1.67	1.50	19.22	15.73	19.62	
4.5	140/14	3.06	5.29	6.51	5.43	0.98	0.84	0.73	0.65	0.59	9.88	8.13	10.20	
	140/16	3.48	6.00	7.39	6.16	1.11	0.95	0.83	0.74	0.67	11.76	9.20	12.13	
	170/15	3.62	8.41	10.95	9.12	1.56	1.34	1.17	1.04	0.93	13.46	10.63	13.84	
	170/16	3.86	9.16	11.64	9.70	1.70	1.45	1.27	1.13	1.02	14.66	11.29	15.07	
	170/18	4.33	10.64	13.01	10.84	1.97	1.69	1.48	1.31	1.18	17.02	12.57	17.48	
	200/16	4.48	11.81	18.82	15.68	2.19	1.87	1.64	1.46	1.31	18.89	15.54	19.37	
5.0	140/14	3.06	4.25	5.27	4.40	0.71	0.61	0.53	0.47	0.42	8.85	6.28	9.21	
	140/16	3.48	4.82	5.98	4.99	0.80	0.69	0.60	0.54	0.48	10.54	7.12	10.95	
	170/15	3.62	7.21	8.87	7.39	1.20	1.03	0.90	0.80	0.72	12.06	8.16	12.49	
	170/16	3.86	7.67	9.43	7.86	1.28	1.10	0.96	0.85	0.77	13.14	8.66	13.59	
	170/18	4.33	8.57	10.54	8.78	1.43	1.22	1.07	0.95	0.86	15.27	9.65	15.77	
	200/16	4.48	10.59	15.24	12.70	1.77	1.51	1.32	1.18	1.06	16.95	14.02	17.47	
	200/18	5.03	12.47	17.05	14.21	2.08	1.78	1.56	1.39	1.25	19.95	16.23	20.55	
	200/20	5.58	14.30	18.84	15.70	2.38	2.04	1.79	1.59	1.43	22.88	17.88	23.54	
	240/18	5.77	15.72	27.46	22.88	2.62	2.25	1.96	1.75	1.57	25.15	20.72	25.83	
5.5	170/15	3.62	5.91	7.33	6.11	0.90	0.77	0.67	0.60	0.54	10.92	6.35	11.39	
	170/16	3.86	6.29	7.79	6.49	0.95	0.82	0.71	0.63	0.57	11.90	6.75	12.39	
	170/18	4.33	7.02	8.71	7.26	1.06	0.91	0.80	0.71	0.64	13.82	7.53	14.27	
	200/16	4.48	9.59	12.60	10.50	1.45	1.25	1.09	0.97	0.87	15.35	11.51	15.93	
	200/18	5.03	11.30	14.09	11.74	1.71	1.47	1.28	1.14	1.03	18.07	12.84	18.73	
	200/20	5.58	12.67	15.57	12.97	1.92	1.65	1.44	1.28	1.15	20.73	14.15	21.45	
	240/18	5.77	14.24	22.69	18.91	2.16	1.85	1.62	1.44	1.29	22.79	18.36	23.54	
	240/20	6.39	16.46	25.09	20.91	2.49	2.14	1.87	1.66	1.50	26.33	20.23	27.16	
6.0	170/15	3.62	4.92	6.16	5.13	0.68	0.59	0.51	0.46	0.41	9.96	5.04	10.34	
	170/16	3.86	5.23	6.55	5.46	0.73	0.62	0.54	0.48	0.44	10.85	5.36	10.98	
	170/18	4.33	5.84	7.32	6.10	0.81	0.70	0.61	0.54	0.49	12.61	5.98	12.24	
	200/16	4.48	8.56	10.58	8.82	1.19	1.02	0.89	0.79	0.71	14.01	9.19	14.64	
	200/18	5.03	9.57	11.84	9.87	1.33	1.14	1.00	0.89	0.80	16.50	10.25	17.21	
	200/20	5.58	10.57	13.08	10.90	1.47	1.26	1.10	0.98	0.88	18.93	11.30	19.72	
	240/18	5.77	13.01	19.07	15.89	1.81	1.55	1.36	1.20	1.08	20.81	14.73	21.63	
	240/20	6.39	15.03	21.08	17.57	2.09	1.79	1.57	1.39	1.25	24.05	16.23	24.95	
	240/25	7.94	20.02	26.03	21.69	2.78	2.38	2.09	1.85	1.67	32.03	19.89	33.15	
6.5	200/16	4.48	7.23	9.02	7.52	0.93	0.79	0.70	0.62	0.56	12.87	7.44	13.56	
	200/18	5.03	8.09	10.09	8.41	1.04	0.89	0.78	0.69	0.62	15.17	8.31	15.94	
	200/20	5.58	8.93	11.15	9.29	1.15	0.98	0.86	0.76	0.69	17.40	9.16	17.99	
	240/18	5.77	11.96	16.25	13.54	1.53	1.31	1.15	1.02	0.92	19.14	11.94	20.02	
	240/20	6.39	13.82	17.96	14.97	1.77	1.52	1.33	1.18	1.06	22.12	13.16	23.10	
	240/25	7.94	17.98	22.18	18.48	2.30	1.98	1.73	1.54	1.38	29.46	16.14	30.29	
	240/30	9.47	21.30	26.29	21.91	2.73	2.34	2.05	1.82	1.64	36.74	19.04	35.71	
7.0	200/16	4.48	6.17	7.78	6.48	0.73	0.63	0.55	0.49	0.44	11.89	6.12	12.63	12.63
	200/18	5.03	6.90	8.70	7.25	0.82	0.70	0.62	0.55	0.49	14.02	6.83	14.20	14.84
	200/20	5.58	7.63	9.61	8.01	0.91	0.78	0.68	0.61	0.54	16.08	7.54	15.65	17.00
	240/18	5.77	11.06	14.01	11.67	1.32	1.13	0.99	0.88	0.79	17.69	9.81	18.64	18.64
	240/20	6.39	12.47	15.49	12.91	1.48	1.27	1.11	0.99	0.89	20.45	10.82	21.51	21.51
	240/25	7.94	15.39	19.12	15.94	1.83	1.57	1.37	1.22	1.10	27.25	13.29	26.66	28.56
	240/30	9.47	18.24	22.67	18.89	2.17	1.86	1.63	1.45	1.30	33.99	15.70	31.40	34.32

BUTTED PURLINS

Span	Section	Weight (kg/m)	Allowable Working Loads for Gravity Case								Ultimate loads in kN (purlin SW incl)			
			Total	Deflection controlled		Allowable Values in kN/m2(with defl=L/180 max)					Gravity	Uplift	Uplift	Uplift
			Load (kN)	Span/ 150	Span/ 180	1200 mm	1400 mm	1600 mm	1800 mm	2000 mm	Down	0 rows	1 row	2 rows
7.5	240/18	5.77	9.75	12.20	10.17	1.08	0.93	0.81	0.72	0.65	16.44	8.17	17.19	17.46
	240/20	6.39	10.77	13.49	11.24	1.20	1.03	0.90	0.80	0.72	19.00	9.02	18.95	20.13
	240/25	7.94	13.30	16.66	13.88	1.48	1.27	1.11	0.99	0.89	25.33	11.09	23.23	26.69
	240/30	9.47	15.76	19.74	16.45	1.75	1.50	1.31	1.17	1.05	31.60	13.12	27.35	31.55
8.0	240/18	5.77	8.49	10.73	8.94	0.88	0.76	0.66	0.59	0.53	15.33		14.89	16.42
	240/20	6.39	9.38	11.86	9.88	0.98	0.84	0.73	0.65	0.59	17.73		16.41	18.94
	240/25	7.94	11.58	14.64	12.20	1.21	1.03	0.90	0.80	0.72	23.64		20.12	24.56
	240/30	9.47	13.72	17.35	14.46	1.43	1.22	1.07	0.95	0.86	29.50		23.71	29.01
8.5	240/18	5.77	7.44	9.50	7.92	0.73	0.62	0.55	0.49	0.44	14.35		12.88	15.51
	240/20	6.39	8.22	10.51	8.75	0.81	0.69	0.60	0.54	0.48	16.60		14.20	17.88
	240/25	7.94	10.15	12.97	10.81	0.99	0.85	0.75	0.66	0.60	22.14		17.42	22.57
	240/30	9.47	12.02	15.37	12.81	1.18	1.01	0.88	0.79	0.71	27.64		20.55	26.64
	300/25	10.02	20.62	25.90	21.58	2.02	1.73	1.52	1.35	1.21	32.99		35.00	35.00
	300/30	11.97	24.65	30.78	25.65	2.42	2.07	1.81	1.61	1.45	41.87		43.43	44.27
9.0	240/20	6.39	7.24	9.37	7.81	0.67	0.57	0.50	0.45	0.40	15.60		12.33	16.84
	240/25	7.94	8.94	11.57	9.64	0.83	0.71	0.62	0.55	0.50	20.81		15.14	20.69
	240/30	9.47	10.59	13.71	11.43	0.98	0.84	0.74	0.65	0.59	25.97		17.88	24.40
	300/25	10.02	18.37	23.10	19.25	1.70	1.46	1.28	1.13	1.02	31.02		33.14	33.15
	300/30	11.97	21.82	27.45	22.88	2.02	1.73	1.52	1.35	1.21	39.39		39.17	41.92
9.5	300/25	10.02	16.35	20.74	17.28	1.43	1.23	1.08	0.96	0.86	29.26		29.73	31.50
	300/30	11.97	19.42	24.64	20.53	1.70	1.46	1.28	1.14	1.02	37.15		35.12	39.83
10.0	300/25	10.02	14.61	18.71	15.59	1.22	1.04	0.91	0.81	0.73	27.66		26.56	30.02
	300/30	11.97	17.36	22.24	18.53	1.45	1.24	1.08	0.96	0.87	35.14		31.38	37.82
10.5	300/25	10.02	13.11	16.97	14.14	1.04	0.89	0.78	0.69	0.62	26.21		23.71	28.69
	300/30	11.97	15.57	20.17	16.81	1.24	1.06	0.93	0.82	0.74	33.30		28.02	35.43
11.0	300/25	10.02	11.81	15.47	12.89	0.89	0.77	0.67	0.60	0.54	24.88		21.19	27.48
	300/30	11.97	14.02	18.38	15.31	1.06	0.91	0.80	0.71	0.64	31.63		25.07	33.14

HEAVY END-BAY PURLINS

Span	Section	Weight (kg/m)	Allowable Working Loads for Gravity Case						Ultimate loads in kN (purlin SW incl)							
			Total Loads (kN)		Deflection controlled				Gravity		Uplift		Uplift		Uplift	
			End Bay	Inner Bay	Span/150		Span/180		Down		0 rows		1 row		2 rows	
					End	Inner	End	Inner	End	Inner	End	Inner	End	Inner	End	Inner
3.5	140/14	3.06	11.11	14.32	17.07	25.98	14.22	21.65	17.77	22.90	14.44	18.55	18.02	23.16		
	140/16	3.48	13.22	17.03	19.36	29.48	16.14	24.56	21.15	27.25	17.17	22.06	21.43	27.54		
	170/15	3.62	14.91	19.48	28.69	43.68	23.91	36.40	23.85	31.16	19.34	25.19	24.15	31.46		
4.0	140/14	3.06	9.69	12.50	13.07	19.89	10.89	16.58	15.51	20.00	12.66	16.26	15.80	20.29		
	140/16	3.48	11.54	14.88	14.83	22.57	12.35	18.81	18.46	23.80	15.06	19.33	18.79	24.13		
	170/15	3.62	13.01	17.01	21.97	33.44	18.31	27.87	20.82	27.22	16.96	22.08	21.16	27.56		
	170/16	3.86	14.27	18.52	23.36	35.55	19.46	29.63	22.83	29.64	18.59	24.03	23.20	30.00		
	170/18	4.33	16.69	21.51	26.11	39.74	21.75	33.12	26.70	34.42	21.72	27.89	27.11	34.83		
4.5	140/14	3.06	8.47	11.09	10.32	15.72	8.60	13.10	13.75	17.74	11.20	14.37	14.07	18.06		
	140/16	3.48	9.61	13.19	11.71	17.83	9.76	14.86	16.36	21.11	12.68	16.27	16.73	21.48		
	170/15	3.62	11.54	15.09	17.36	26.42	14.46	22.02	18.46	24.15	14.46	18.82	18.85	24.53		
	170/16	3.86	12.65	16.44	18.45	28.09	15.38	23.41	20.25	26.30	15.46	19.97	20.65	26.70		
	170/18	4.33	14.80	19.09	20.63	31.40	17.19	26.17	23.68	30.54	17.34	22.25	24.14	31.00		
	200/16	4.48	16.01	21.17	29.83	45.41	24.86	37.84	25.61	33.88	20.91	27.52	26.09	34.35		
5.0	140/14	3.06	6.82	9.95	8.36	12.73	6.97	10.61	12.33	15.93	8.65	11.08	12.69	16.29		
	140/16	3.48	7.74	11.85	9.49	14.44	7.91	12.04	14.68	18.96	9.79	12.55	15.09	19.36		
	170/15	3.62	10.36	13.55	14.06	21.40	11.72	17.84	16.57	21.69	11.08	14.39	17.00	22.11		
	170/16	3.86	11.36	14.76	14.95	22.75	12.46	18.96	18.17	23.62	11.84	15.28	18.63	24.07		
	170/18	4.33	13.28	17.14	16.71	25.43	13.92	21.19	21.25	27.43	13.28	17.03	21.76	27.94		
	200/16	4.48	14.37	19.02	24.16	36.78	20.14	30.65	22.99	30.43	18.86	24.81	23.52	30.96		
5.5	140/14	3.06	5.59	8.60	6.91	10.52	5.76	8.77	11.17	14.44	6.74	8.63	11.57	14.83		
	140/16	3.48	6.35	9.76	7.84	11.94	6.53	9.95	13.30	17.19	7.65	9.78	13.75	17.64		
	170/15	3.62	9.38	12.29	11.62	17.69	9.68	14.74	15.02	19.67	8.61	11.16	15.48	20.14		
	170/16	3.86	10.09	13.39	12.35	18.81	10.30	15.67	16.47	21.42	9.20	11.86	16.97	21.92		
	170/18	4.33	11.27	15.55	13.81	21.02	11.51	17.52	19.27	24.88	10.33	13.22	19.83	25.44		
	200/16	4.48	13.03	17.25	19.97	30.40	16.64	25.33	20.84	27.61	15.46	20.32	21.42	28.19		
	200/18	5.03	15.56	20.31	22.34	34.01	18.62	28.34	24.89	32.49	17.48	22.66	25.54	33.15		
	200/20	5.58	18.04	23.29	24.68	37.58	20.57	31.31	28.87	37.26	19.47	24.97	29.59	37.98		
6.0	140/14	3.06	4.66	7.19	5.81	8.84	4.84	7.37	10.20	13.19	5.35	6.84	10.63	13.63		
	140/16	3.48	5.29	8.15	6.59	10.03	5.49	8.36	12.15	15.71	6.08	7.76	12.64	16.20		
	170/15	3.62	7.92	11.24	9.76	14.86	8.14	12.39	13.72	17.98	6.81	8.82	14.23	18.49		
	170/16	3.86	8.42	12.24	10.38	15.80	8.65	13.17	15.05	19.58	7.29	9.37	15.59	20.13		
	170/18	4.33	9.41	14.22	11.60	17.66	9.67	14.72	17.60	22.75	8.19	10.46	17.85	22.90		
	200/16	4.48	11.90	15.78	16.78	25.54	13.98	21.29	19.05	25.25	12.32	16.17	19.68	25.88		
	200/18	5.03	14.22	18.58	18.77	28.58	15.64	23.81	22.75	29.72	13.93	18.04	23.46	30.43		
	200/20	5.58	16.49	21.30	20.74	31.57	17.28	26.31	26.39	34.08	15.52	19.88	27.18	34.87		
	240/18	5.77	17.51	23.41	30.23	46.02	25.19	38.35	28.02	37.45	19.59	25.97	28.83	38.26		
6.5	170/15	3.62	6.70	10.32	8.32	12.66	6.93	10.55	12.61	16.55	5.49	7.10	12.86	16.70		
	170/16	3.86	7.13	10.97	8.85	13.46	7.37	11.22	13.84	18.03	5.88	7.54	13.74	17.73		
	170/18	4.33	7.96	12.27	9.89	15.05	8.24	12.54	16.19	20.94	6.61	8.43	15.42	19.75		
	200/16	4.48	10.95	14.53	14.30	21.77	11.92	18.14	17.52	23.24	9.95	13.03	18.21	23.93		
	200/18	5.03	13.01	17.10	16.00	24.35	13.33	20.29	20.93	27.37	11.26	14.55	21.70	28.14		
	200/20	5.58	14.37	19.61	17.67	26.90	14.73	22.42	24.28	31.38	12.55	16.04	25.14	32.24		
	240/18	5.77	16.12	21.56	25.76	39.21	21.47	32.68	25.79	34.49	15.86	20.98	26.67	35.38		
	240/20	6.39	18.89	24.90	28.48	43.36	23.73	36.13	30.23	39.85	17.72	23.13	31.21	40.83		
	240/25	7.94	25.67	33.15	35.16	53.53	29.30	44.61	41.07	53.04	22.16	28.36	42.29	54.25		
	240/30	9.47	32.00	41.32	41.68	63.44	34.73	52.87	51.20	66.11	26.13	33.45	51.09	65.55		
7.0	170/15	3.62	5.73	8.85	7.17	10.92	5.98	9.10	11.66	15.32	4.51	5.81	10.97	14.24	12.26	15.92
	170/16	3.86	6.09	9.41	7.63	11.61	6.36	9.67	12.80	16.69	4.83	6.18	11.73	15.11	13.43	17.32
	170/18	4.33	6.81	10.52	8.52	12.98	7.10	10.81	14.98	19.39	5.44	6.91	13.16	16.84	15.54	19.89
	200/16	4.48	9.97	13.45	12.33	18.77	10.27	15.64	16.21	21.53	8.15	10.66	16.95	22.26	16.95	22.26
	200/18	5.03	11.15	15.84	13.79	21.00	11.49	17.50	19.37	25.35	9.23	11.90	20.20	26.18	20.20	26.18
	200/20	5.58	12.32	18.17	15.24	23.20	12.70	19.33	22.48	29.07	10.30	13.14	22.96	29.43	23.39	29.99
	240/18	5.77	14.92	19.97	22.21	33.81	18.51	28.18	23.87	31.95	13.00	17.17	24.82	32.90	24.82	32.90
	240/20	6.39	17.49	23.07	24.56	37.38	20.47	31.15	27.98	36.92	14.53	18.93	29.04	37.97	29.04	37.97
	240/25	7.94	23.77	30.71	30.32	46.15	25.27	38.46	38.03	49.14	18.19	23.25	38.72	49.65	39.34	50.45
	240/30	9.47	29.29	38.29	35.93	54.70	29.95	45.58	47.42	61.26	21.49	27.45	45.64	58.53	47.86	61.38

HEAVY END-BAY PURLINS

Span	Section	Weight (kg/m)	Allowable Working Loads for Gravity Case						Ultimate loads in kN (purlin SW incl)							
			Total Loads (kN)		Deflection controlled				Gravity		Uplift		Uplift		Uplift	
					Span/150		Span/180		Down		0 rows		1 row		2 rows	
			End Bay	Inner Bay	End	Inner	End	Inner	End	Inner	End	Inner	End	Inner	End	Inner
7.5	200/16	4.48	8.62	12.52	10.74	16.35	8.95	13.62	15.07	20.03	6.78	8.84	15.86	20.82	15.86	20.82
	200/18	5.03	9.64	14.74	12.01	18.29	10.01	15.24	18.01	23.59	7.68	9.88	18.08	23.41	18.90	24.48
	200/20	5.58	10.65	16.43	13.27	20.21	11.06	16.84	20.90	27.06	8.57	10.91	20.14	25.79	21.89	28.04
	240/18	5.77	13.88	18.59	19.35	29.45	16.12	24.54	22.20	29.75	10.80	14.23	23.22	30.76	23.22	30.76
	240/20	6.39	16.27	21.48	21.39	32.56	17.83	27.14	26.03	34.37	12.08	15.70	27.16	35.50	27.16	35.50
	240/25	7.94	21.43	28.60	26.41	40.21	22.01	33.50	35.39	45.76	15.14	19.31	34.33	44.00	36.79	47.16
	240/30	9.47	25.39	35.66	31.30	47.65	26.09	39.71	44.13	57.05	17.91	22.84	40.44	51.82	44.13	56.56
8.0	200/16	4.48	7.51	11.62	9.44	14.37	7.87	11.97	14.07	18.72			13.90	18.23	14.91	19.56
	200/18	5.03	8.40	13.00	10.56	16.07	8.80	13.40	16.82	22.05			15.72	20.34	17.77	23.00
	200/20	5.58	9.29	14.36	11.67	17.76	9.72	14.80	19.52	25.29			17.51	22.41	20.57	26.34
	240/18	5.77	12.96	17.38	17.01	25.89	14.17	21.57	20.74	27.81			21.60	28.60	21.82	28.90
	240/20	6.39	15.17	20.09	18.80	28.62	15.67	23.85	24.32	32.14			24.14	31.52	25.53	33.34
	240/25	7.94	18.72	26.75	23.21	35.34	19.35	29.45	33.07	42.80			30.18	38.64	34.48	44.17
	240/30	9.47	22.18	33.35	27.51	41.88	22.93	34.90	41.25	53.36			35.53	45.50	40.75	52.20
8.5	200/16	4.48	6.59	10.23	8.36	12.73	6.97	10.61	13.18	17.56			12.05	15.78	14.08	18.46
	200/18	5.03	7.38	11.45	9.35	14.24	7.80	11.87	15.76	20.68			13.63	17.61	16.77	21.69
	200/20	5.58	8.15	12.65	10.34	15.73	8.61	13.11	18.30	23.73			15.19	19.41	19.09	24.41
	240/18	5.77	12.07	16.31	15.06	22.93	12.55	19.11	19.44	26.10			18.88	24.97	20.59	27.25
	240/20	6.39	13.35	18.85	16.66	25.35	13.88	21.13	22.81	30.16			21.10	27.52	24.08	31.44
	240/25	7.94	16.47	25.11	20.56	31.30	17.14	26.08	31.02	40.17			26.37	33.74	31.86	40.79
	240/30	9.47	19.52	30.12	24.37	37.10	20.31	30.91	38.70	50.10			31.07	39.74	37.64	48.17
9.0	240/18	5.77	10.69	15.36	13.44	20.45	11.20	17.04	18.28	24.57			16.48	21.76	19.51	25.79
	240/20	6.39	11.82	17.75	14.86	22.61	12.38	18.85	21.45	28.40			18.41	23.99	22.81	29.76
	240/25	7.94	14.58	22.57	18.34	27.92	15.28	23.27	29.19	37.83			23.03	29.42	29.41	37.62
	240/30	9.47	17.28	26.74	21.74	33.09	18.12	27.58	36.42	47.19			27.15	34.69	34.71	44.39
	300/25	10.02	26.60	35.15	36.63	55.76	30.52	46.46	42.56	56.24			44.68	58.36	44.68	58.36
	300/30	11.97	34.45	44.58	43.52	66.25	36.27	55.21	55.11	71.32			57.03	73.07	57.65	73.86
9.5	240/18	5.77	9.51	14.50	12.06	18.36	10.05	15.30	17.24	23.20			14.41	19.00	18.53	24.49
	240/20	6.39	10.52	16.32	13.33	20.30	11.11	16.91	20.24	26.82			16.10	20.95	21.62	28.17
	240/25	7.94	12.98	20.14	16.46	25.06	13.72	20.88	27.55	35.74			20.15	25.72	27.08	34.59
	240/30	9.47	15.38	23.87	19.51	29.70	16.26	24.75	34.38	44.58			23.79	30.36	31.93	40.78
	300/25	10.02	25.12	33.21	32.87	50.04	27.39	41.70	40.18	53.14			42.43	55.39	42.43	55.39
	300/30	11.97	31.44	42.13	39.06	59.46	32.55	49.55	52.05	67.41			51.85	66.38	54.73	70.09
10.0	240/18	5.77	8.50	13.24	10.88	16.57	9.07	13.81	16.30	21.96			12.65	16.65	17.66	23.32
	240/20	6.39	9.40	14.64	12.03	18.32	10.03	15.26	19.14	25.39			14.14	18.36	19.85	25.83
	240/25	7.94	11.60	18.07	14.86	22.62	12.38	18.85	26.07	33.84			17.72	22.57	24.84	31.70
	240/30	9.47	13.74	21.41	17.61	26.80	14.67	22.34	32.53	42.22			20.94	26.68	29.27	37.33
	300/25	10.02	23.74	31.47	29.67	45.16	24.72	37.64	38.04	50.35			38.90	50.74	40.40	52.71
	300/30	11.97	28.20	39.92	35.25	53.66	29.38	44.72	49.29	63.88			46.86	59.95	52.11	66.70
10.5	300/25	10.02	21.39	29.89	26.91	40.96	22.43	34.14	36.10	47.82			35.02	45.64	38.57	50.30
	300/30	11.97	25.41	37.92	31.98	48.67	26.65	40.56	46.78	60.68			42.19	53.92	49.74	63.64
11.0	300/25	10.02	19.35	28.45	24.52	37.32	20.43	31.10	34.32	45.51			31.47	40.97	36.92	48.11
	300/30	11.97	22.99	35.67	29.14	44.35	24.28	36.96	44.49	57.76			37.92	48.41	46.78	59.81
11.5	300/25	10.02	17.56	27.12	22.43	34.15	18.69	28.46	32.69	43.40			28.29	36.77	35.41	46.11
	300/30	11.97	20.86	32.46	26.66	40.58	22.21	33.81	42.40	55.09			34.09	43.47	43.92	56.12
12.0	300/25	10.02	15.99	24.96	20.60	31.36	17.17	26.14	31.20	41.46			25.48	33.07	34.03	44.29
	300/30	11.97	18.99	29.65	24.48	37.27	20.40	31.06	40.47	52.63			30.72	39.11	41.17	52.56
12.5	300/25	10.02	14.59	22.86	18.99	28.90	15.82	24.09	29.81	39.66			23.01	29.82	31.93	41.52
	300/30	11.97	17.33	27.15	22.56	34.34	18.80	28.62	38.69	50.36			27.76	35.29	38.50	49.11

SLEEVED SHEETING RAILS

Span	Section	Weight (kg/m)	Allowable Working Loads (Total load in kN)					
			Wind Pressure	Wind Suction			Deflection Controlled	
			Total UDL(kN)	0 Rows	1 Row	2 Rows	(L/100)	(L/150)
3.5	140/14	3.06	12.80	10.24	12.80		26.91	17.94
	140/16	3.48	15.22	12.18	15.22		30.54	20.36
	170/15	3.62	17.16	13.73	17.16		45.25	30.16
4.0	140/14	3.06	11.20	8.96	11.20		20.60	13.74
	140/16	3.48	13.32	10.66	13.32		23.38	15.59
	170/15	3.62	15.02	12.01	15.02		34.64	23.09
	170/16	3.86	16.46	13.17	16.46		36.83	24.55
4.5	140/14	3.06	9.95	7.91	9.95		16.28	10.85
	140/16	3.48	11.84	8.95	11.84		18.47	12.31
	170/15	3.62	13.35	10.22	13.35		27.37	18.25
	170/16	3.86	14.63	10.92	14.63		29.10	19.40
5.0	140/14	3.06	8.96	6.07	8.96		13.19	8.79
	140/16	3.48	10.66	6.87	10.66		14.96	9.97
	170/15	3.62	12.01	7.78	12.01		22.17	14.78
	170/16	3.86	13.17	8.32	13.17		23.57	15.71
	170/18	4.33	15.39	9.34	15.39		26.35	17.56
	200/16	4.48	16.64	13.31	16.64		38.10	25.40
5.5	140/14	3.06	8.14	4.70	8.14		10.90	7.27
	140/16	3.48	9.69	5.33	9.69		12.37	8.24
	170/15	3.62	10.92	6.01	10.92		18.32	12.22
	170/16	3.86	11.97	6.42	11.97		19.48	12.99
	170/18	4.33	13.99	7.21	13.99		21.77	14.52
	200/16	4.48	15.13	10.87	15.13		31.49	20.99
	200/18	5.03	18.05	12.29	18.05		35.23	23.49
6.0	140/16	3.48	8.88	4.19	8.88		10.39	6.93
	170/15	3.62	10.01	4.71	10.01		15.40	10.26
	170/16	3.86	10.97	5.04	10.97		16.37	10.91
	170/18	4.33	12.83	5.67	12.57		18.30	12.20
	200/16	4.48	13.87	8.61	13.87		26.46	17.64
	200/18	5.03	16.55	9.74	16.55		29.60	19.74
	200/20	5.58	19.18	10.85	19.18		32.71	21.81
6.5	140/16	3.48	8.20		7.79	7.79	8.85	5.90
	170/15	3.62	9.24		9.02	9.02	13.12	8.75
	170/16	3.86	10.13		9.64	9.64	13.95	9.30
	170/18	4.33	11.84		10.82	10.82	15.59	10.39
	200/16	4.48	12.80		12.80	12.80	22.55	15.03
	200/18	5.03	15.27		15.27	15.27	25.22	16.82
	200/20	5.58	17.70		17.70	17.70	27.87	18.58
	240/18	5.77	18.79		18.79	18.79	40.62	27.08
7.0	170/15	3.62	8.58		7.66	7.66	11.31	7.54
	170/16	3.86	9.41		8.19	8.19	12.03	8.02
	170/18	4.33	11.00		9.19	9.19	13.44	8.96
	200/16	4.48	11.89		11.89	11.89	19.44	12.96
	200/18	5.03	14.18		14.18	14.18	21.75	14.50
	200/20	5.58	16.44		16.13	16.13	24.03	16.02
	240/18	5.77	17.45		17.45	17.45	35.02	23.35
7.5	170/15	3.62	8.01		6.47	6.47	9.85	6.57
	170/16	3.86	8.78		6.92	6.92	10.48	6.98
	170/18	4.33	10.26		7.76	7.76	11.71	7.81
	200/16	4.48	11.10		11.10	11.10	16.94	11.29
	200/18	5.03	13.24		12.65	12.65	18.95	12.63
	200/20	5.58	15.34		14.09	14.09	20.93	13.96
	240/18	5.77	16.28		16.28	16.28	30.51	20.34

SLEEVED SHEETING RAILS

Span	Section	Weight (kg/m)	Allowable Working Loads (Total load in kN)					
			Wind Pressure	Wind Suction			Deflection Controlled	
			Total UDL(kN)	0 Rows	1 Row	2 Rows	(L/100)	(L/150)
8.0	200/16	4.48	10.40			9.29	14.88	9.92
	200/18	5.03	12.41			10.50	16.65	11.10
	200/20	5.58	14.38			11.70	18.40	12.27
	240/18	5.77	15.26			14.45	26.82	17.88
	240/20	6.39	17.87			16.16	29.65	19.77
	240/25	7.94	24.25			20.20	36.61	24.40
8.5	200/16	4.48	9.79			8.06	13.19	8.79
	200/18	5.03	11.68			9.12	14.75	9.83
	200/20	5.58	13.54			10.15	16.30	10.86
	240/18	5.77	14.37			12.66	23.75	15.84
	240/20	6.39	16.82			14.15	26.26	17.51
	240/25	7.94	22.82			17.68	32.43	21.62
	240/30	9.47	28.43			20.80	38.43	25.62
9.0	200/16	4.48	9.25			6.99	11.76	7.84
	200/18	5.03	11.03			7.90	13.16	8.77
	200/20	5.58	12.78			8.80	14.54	9.69
	240/18	5.77	13.57			11.06	21.19	14.13
	240/20	6.39	15.89			12.36	23.43	15.62
	240/25	7.94	21.55			15.43	28.92	19.28
	240/30	9.47	26.85			18.15	34.28	22.85
	300/25	10.02	31.28			31.28	57.76	38.51
	300/30	11.97	40.42			37.89	68.63	45.75

Span	Section	Weight (kg/m)	Allowable Working Loads (Total lead in kN)					
			Wind Pressure	Wind Suction			Deflection Controlled	
			Total UDL(kN)	1 Rows	2 Row	3 Rows	(L/100)	(L/150)
9.5	200/20	5.58	12.11		7.65	10.48	13.05	8.70
	240/18	5.77	12.85		9.65	12.82	19.02	12.68
	240/20	6.39	15.05		10.78	14.34	21.03	14.02
	240/25	7.94	20.42		13.47	17.94	25.96	17.31
	240/30	9.47	25.44		15.85	21.14	30.77	20.51
	300/25	10.02	29.64		28.56	29.64	51.84	34.56
	300/30	11.97	38.30		34.45	38.30	61.60	41.06
10.0	240/18	5.77	12.21		8.44	11.60	17.16	11.44
	240/20	6.39	14.30		9.43	12.96	18.98	12.65
	240/25	7.94	19.40		11.78	16.21	23.43	15.62
	240/30	9.47	24.17		13.87	19.08	27.77	18.51
	300/25	10.02	28.16		25.86	28.16	46.78	31.19
	300/30	11.97	36.38		31.17	36.25	55.59	37.06
10.5	300/25	10.02	26.81			26.81	42.43	28.29
	300/30	11.97	34.65			33.82	50.42	33.62
11.0	300/25	10.02	25.60			25.60	38.66	25.78
	300/30	11.97	33.07			31.50	45.94	30.63
11.5	300/25	10.02	24.48			24.25	35.38	23.58
	300/30	11.97	31.64			29.26	42.03	28.02
12.0	300/25	10.02	23.46			22.47	32.49	21.66
	300/30	11.97	30.32			27.10	38.60	25.74
12.5	300/25	10.02	22.52			20.75	29.94	19.96
	300/30	11.97	29.10			25.01	35.58	23.72

BUTTED SHEETING RAILS

Span	Section	Weight (kg/m)	Allowable Working Loads (Total load in kN)					
			Wind Pressure	Wind Suction			Deflection Controlled	
			Total UDL(kN)	0 Rows	1 Row	2 Rows	(L/100)	(L/150)
3.5	140/14	3.06	9.24	7.39	9.24	9.24	16.16	10.77
	140/16	3.48	10.99	8.80	10.99	10.99	18.33	12.22
	170/15	3.62	12.56	10.05	12.56	12.56	27.16	18.11
4.0	140/14	3.06	8.09	6.47	8.09	8.09	12.37	8.25
	140/16	3.48	9.62	7.70	9.62	9.62	14.03	9.36
	170/15	3.62	10.99	8.80	10.99	10.99	20.80	13.86
	170/16	3.86	11.97	9.58	11.97	11.97	22.11	14.74
4.5	140/14	3.06	7.19	5.71	7.19	7.19	9.77	6.52
	140/16	3.48	8.55	6.46	8.55	8.55	11.09	7.39
	170/15	3.62	9.77	7.48	9.77	9.77	16.43	10.95
	170/16	3.86	10.64	7.94	10.64	10.64	17.47	11.65
5.0	140/14	3.06	6.47	4.38	6.47	6.47	7.92	5.28
	140/16	3.48	7.70	4.96	7.70	7.70	8.98	5.99
	170/15	3.62	8.80	5.70	8.80	8.80	13.31	8.87
	170/16	3.86	9.58	6.05	9.58	9.58	14.15	9.43
	170/18	4.33	11.12	6.74	11.12	11.12	15.82	10.54
	200/16	4.48	12.32	9.86	12.32	12.32	22.88	15.25
	200/18	5.03	14.50	11.42	14.50	14.50	25.59	17.06
5.5	140/14	3.06	5.88	3.39	5.88	5.88	6.54	4.36
	140/16	3.48	7.00	3.85	7.00	7.00	7.42	4.95
	170/15	3.62	8.00	4.40	8.00	8.00	11.00	7.33
	170/16	3.86	8.70	4.67	8.70	8.70	11.70	7.80
	170/18	4.33	10.11	5.21	10.03	10.03	13.07	8.71
	200/16	4.48	11.20	8.05	11.20	11.20	18.91	12.60
	200/18	5.03	13.18	8.98	13.18	13.18	21.15	14.10
	200/20	5.58	15.11	9.89	15.11	15.11	23.37	15.58
	240/18	5.77	16.59	12.89	16.59	16.59	34.06	22.71
6.0	170/15	3.62	7.33	3.45	7.23	7.23	9.24	6.16
	170/16	3.86	7.98	3.67	7.68	7.68	9.83	6.55
	170/18	4.33	9.26	4.09	8.56	8.56	10.98	7.32
	200/16	4.48	10.27	6.38	10.27	10.27	15.89	10.59
	200/18	5.03	12.08	7.11	12.08	12.08	17.77	11.85
	200/20	5.58	13.85	7.84	13.85	13.85	19.64	13.09
	240/18	5.77	15.21	10.28	15.21	15.21	28.62	19.08
	240/20	6.39	17.56	11.32	17.56	17.56	31.64	21.10
6.5	170/15	3.62	6.77		6.08	6.08	7.88	5.25
	170/16	3.86	7.37		6.46	6.46	8.37	5.58
	170/18	4.33	8.55		7.19	7.19	9.36	6.24
	200/16	4.48	9.48		9.48	9.48	13.54	9.02
	200/18	5.03	11.15		11.15	11.15	15.14	10.10
	200/20	5.58	12.78		12.59	12.59	16.73	11.15
	240/18	5.77	14.04		14.04	14.04	24.39	16.26
	240/20	6.39	16.21		16.21	16.21	26.96	17.97
7.0	170/15	3.62	6.28		5.07	5.07	6.79	4.53
	170/16	3.86	6.84		5.39	5.39	7.22	4.81
	170/18	4.33	7.94		6.01	6.01	8.07	5.38
	200/16	4.48	8.80		8.80	8.80	11.67	7.78
	200/18	5.03	10.36		9.90	9.90	13.06	8.70
	200/20	5.58	11.87		10.90	10.90	14.43	9.62
	240/18	5.77	13.03		13.03	13.03	21.03	14.02
	240/20	6.39	15.05		15.05	15.05	23.25	15.50
	240/25	7.94	20.01		18.65	18.65	28.70	19.14

BUTTED SHEETING RAILS

Span	Section	Weight (kg/m)	Allowable Working Loads (Total load in kN)					
			Wind Pressure	Wind Suction			Deflection Controlled	
			Total UDL(kN)	0 Rows	1 Row	2 Rows	(L/100)	(L/150)
7.5	170/15	3.62	5.86		4.24	4.24	5.92	3.94
	170/16	3.86	6.29		4.50	4.50	6.29	4.19
	170/18	4.33	7.03		5.02	5.02	7.03	4.69
	200/16	4.48	8.22		7.60	7.60	10.17	6.78
	200/18	5.03	9.67		8.48	8.48	11.37	7.58
	200/20	5.58	11.08		9.34	9.34	12.57	8.38
	240/18	5.77	12.16		11.97	11.97	18.32	12.21
	240/20	6.39	14.04		13.20	13.20	20.25	13.50
	240/25	7.94	18.68		16.17	16.17	25.00	16.67
8.0	200/16	4.48	7.70		6.48	6.48	8.94	5.96
	200/18	5.03	9.06		7.23	7.23	10.00	6.66
	200/20	5.58	10.39		7.97	7.97	11.04	7.36
	240/18	5.77	11.40		10.31	10.31	16.10	10.73
	240/20	6.39	13.17		11.36	11.36	17.80	11.87
	240/25	7.94	17.51		13.93	13.93	21.98	14.65
	240/30	9.47	21.81		16.40	16.40	26.04	17.36
8.5	200/16	4.48	7.25		5.53	5.53	7.92	5.28
	200/18	5.03	8.53		6.17	6.17	8.86	5.90
	200/20	5.58	9.78		6.81	6.81	9.78	6.52
	240/18	5.77	10.73		8.86	8.86	14.26	9.51
	240/20	6.39	12.39		9.76	9.76	15.77	10.51
	240/25	7.94	16.48		11.97	11.97	19.47	12.98
	240/30	9.47	20.53		14.11	14.11	23.07	15.38
	300/25	10.02	24.40		24.40	24.40	38.87	25.92
9.0	240/18	5.77	10.14		7.62	7.62	12.72	8.48
	240/20	6.39	11.70		8.40	8.40	14.06	9.38
	240/25	7.94	15.56		10.32	10.32	17.36	11.58
	240/30	9.47	19.39		12.18	12.18	20.58	13.72
	300/25	10.02	23.05		23.04	23.04	34.67	23.12

Span	Section	Weight (kg/m)	Allowable Working Loads (Total load in kN)					
			Wind Pressure	Wind Suction			Deflection Controlled	
			Total UDL(kN)	1 Rows	2 Row	3 Rows	(L/100)	(L/150)
9.5	240/18	5.77	9.60		6.53	9.58	11.42	7.61
	240/20	6.39	11.09		7.20	10.56	12.62	8.41
	240/25	7.94	14.74		8.82	12.96	15.58	10.39
	240/30	9.47	18.37		10.38	15.26	18.47	12.31
	300/25	10.02	21.83		19.86	21.83	31.12	20.75
10.0	240/25	7.94	14.01		7.68	11.71	14.06	9.38
	240/30	9.47	16.67		9.05	13.78	16.67	11.11
	300/25	10.02	20.74		17.77	20.74	28.09	18.72
	300/30	11.97	26.27		20.99	26.18	33.37	22.25
10.5	300/25	10.02	19.75			19.75	25.47	16.98
	300/30	11.97	25.02			24.42	30.27	20.18
11.0	300/25	10.02	18.86			18.86	23.21	15.47
	300/30	11.97	23.88			22.75	27.58	18.39

ZED OR CEE SECTION BRICK RESTRAINT

Span	Section	Weight (kg/m)	Allowable Total Working Loads in kN					
			Single Span Case		Double Span Case		Three Span Case	
			Capacity	Span/300	Capacity	Span/300	Capacity	Span/300
3.5	140/14	3.06	8.78	5.11	8.20	12.30	10.11	9.13
	140/16	3.48	10.45	5.80	9.99	13.96	12.38	10.36
	170/16	3.86	13.00	9.14	11.79	21.99	14.48	16.32
	170/18	4.33	15.09	10.22	14.12	24.58	17.42	18.24
4.0	140/14	3.06	7.68	3.92	7.28	9.42	9.01	6.99
	140/16	3.48	9.14	4.44	8.83	10.69	10.96	7.93
	170/16	3.86	11.37	7.00	10.54	16.83	12.98	12.50
	170/18	4.33	13.20	7.82	12.54	18.82	15.51	13.97
	170/20	4.79	15.02	8.64	14.49	20.77	17.98	15.42
	200/20	5.58	19.74	13.98	18.18	33.64	22.37	24.97
4.5	140/16	3.48	8.12	3.51	7.90	8.44	9.83	6.27
	170/16	3.86	10.11	5.53	9.51	13.30	11.75	9.87
	170/18	4.33	11.74	6.18	11.26	14.87	13.96	11.04
	170/20	4.79	13.35	6.82	12.97	16.41	16.12	12.18
	200/20	5.58	17.54	11.05	16.42	26.58	20.26	19.73
	240/20	6.39	22.24	17.81	19.29	42.83	23.51	31.79
5.0	170/16	3.86	9.10	4.48	8.65	10.77	10.71	8.00
	170/18	4.33	10.56	5.01	10.21	12.04	12.68	8.94
	170/20	4.79	12.01	5.53	11.74	13.29	14.60	9.87
	200/20	5.58	15.79	8.95	14.96	21.53	18.50	15.98
	240/20	6.39	20.02	14.42	17.78	34.69	21.75	25.75
5.5	170/18	4.33	9.60	4.14	9.34	9.95	11.61	7.39
	170/20	4.79	10.92	4.57	10.71	10.99	13.34	8.15
	200/20	5.58	14.35	7.40	13.72	17.79	16.99	13.21
	200/25	6.92	18.86	9.12	18.48	21.93	23.00	16.28
	240/20	6.39	18.20	11.92	16.47	28.67	20.21	21.28
	240/25	7.94	24.20	14.72	23.06	35.40	28.55	26.28
6.0	170/25	5.94	12.98	4.72	12.87	11.35	16.06	8.43
	200/18	5.03	11.48	5.63	10.87	13.53	13.45	10.04
	200/20	5.58	13.16	6.22	12.66	14.95	15.71	11.10
	240/20	6.39	16.68	10.02	15.32	24.09	18.84	17.88
	240/25	7.94	22.18	12.37	21.29	29.74	26.40	22.08
	240/30	9.47	27.63	14.66	27.05	35.25	33.66	26.17
6.5	170/25	5.94	11.98	4.02	11.89	9.67	14.85	7.18
	200/20	5.58	12.15	5.30	11.75	12.74	14.59	9.46
	240/20	6.39	15.40	8.53	14.31	20.53	17.63	15.24
	240/25	7.94	20.47	10.54	19.77	25.34	24.54	18.81
	240/30	9.47	25.51	12.49	25.04	30.04	31.19	22.30
7.0	200/20	5.58	11.28	4.57	10.96	10.98	13.62	8.15
	240/20	6.39	14.30	7.36	13.41	17.70	16.56	13.14
	240/25	7.94	19.01	9.09	18.44	21.85	22.91	16.22
	240/30	9.47	23.69	10.77	23.31	25.90	29.05	19.22
	300/25	10.02	28.15	18.14	25.53	43.64	31.33	32.39
	300/30	11.97	35.66	21.56	33.76	51.86	41.75	38.49
7.5	200/20	5.58	10.53	3.98	10.27	9.57	12.77	7.10
	240/20	6.39	13.34	6.41	12.62	15.42	15.60	11.44
	240/25	7.94	17.74	7.91	17.28	19.04	21.48	14.13
	240/30	9.47	22.11	9.38	21.80	22.56	27.18	16.75
	300/25	10.02	26.27	15.80	24.10	38.02	29.64	28.22
	300/30	11.97	33.28	18.78	31.72	45.17	39.28	33.53
8.0	240/25	7.94	16.64	6.96				
	240/30	9.47	20.72	8.24				
	300/25	10.02	24.63	13.89				
	300/30	11.97	31.20	16.51				

ZED OR CEE SECTION BRICK RESTRAINT

Span	Section	Weight (kg/m)	Allowable Total Working Loads in kN					
			Single Span Case		Double Span Case		Three Span Case	
			Capacity	Span/300	Capacity	Span/300	Capacity	Span/300
8.5	240/25	7.94	15.66	6.16				
	240/30	9.47	19.51	7.30				
	300/25	10.02	23.18	12.30				
	300/30	11.97	29.37	14.62				
9.0	300/25	10.02	21.90	10.98				
	300/30	11.97	27.73	13.04				
9.5	300/25	10.02	20.74	9.85				
	300/30	11.97	26.27	11.71				
10.0	300/25	10.02	19.71	8.89				
	300/30	11.97	24.96	10.56				

The capacity values in this table are based on rails being fully restrained by cladding.

EAVES BEAMS

Span	Section	Weight (kg/m)	Allowable Gravity Loads (Unfactured)					
			Single Spans			Double Spans		
			H=1.0	H=1.5	Span/200	H=1.0	H=1.5	Span/200
			Load (kN)	Load (kN)	Load (kN)	Load (kN)	Load (kN)	Load (kN)
3.5	EB200/16	5.10	17.59	17.20	24.03	16.71	16.71	57.79
	EB200/20	6.35	23.65	23.65	31.35	22.47	22.47	75.40
4.0	EB200/16	5.10	15.35	13.33	18.40	14.58	13.74	44.25
	EB200/20	6.35	20.64	19.72	24.00	19.61	19.61	57.73
4.5	EB200/16	5.10	12.79	10.11	14.53	12.92	10.81	34.96
	EB200/20	6.35	18.30	15.62	18.96	17.38	16.16	45.61
5.0	EB200/16	5.10	10.33	7.34	11.77	10.75	8.32	28.32
	EB200/20	6.35	15.40	12.14	15.36	15.59	13.00	36.95
5.5	EB200/16	5.10	8.20	4.92	9.73			
	EB200/20	6.35	12.70	9.10	12.69			
6.0	EB200/20	6.35	10.33	6.41	10.67			
	EB200/25	7.90	15.24	11.09	13.57			
	EB240/25	9.08	22.58	17.97	22.08			
6.5	EB200/20	6.35	12.48	12.18	9.09			
	EB200/25	7.90	16.17	16.17	11.56			
	EB240/25	9.08	21.86	21.86	18.81			
7.0	EB200/20	6.35	11.54	10.58	7.84			
	EB200/25	7.90	14.95	14.86	9.97			
	EB240/25	9.08	20.23	20.23	16.22			
7.5	EB200/25	7.90	13.89	13.09	8.68			
	EB240/25	9.08	18.80	18.80	14.13			
	EB240/30	10.84	22.91	22.91	17.05			
8.0	EB200/25	7.90	12.95	11.48	7.63			
	EB240/25	9.08	17.55	16.98	12.42			
	EB240/30	10.84	21.39	21.39	14.99			
8.5	EB240/25	9.08	16.44	15.10	11.00			
	EB240/30	10.84	20.04	19.67	13.27			
9.0	EB240/25	9.08	15.45	13.38	9.81			
	EB240/30	10.84	18.84	17.65	11.84			
	EB300/30	11.97	23.68	23.68	19.69			
9.5	EB240/30	10.84	17.75	15.79	10.63			
	EB300/30	11.97	22.33	21.58	17.68			
10.0	EB240/30	10.84	16.78	14.07	9.59			
	EB300/30	11.97	21.11	19.53	15.95			
10.5	EB300/30	11.97	20.01	17.62	14.47			
11.0	EB300/30	11.97	19.00	15.85	13.18			
11.5	EB300/30	11.97	17.56	14.18	12.06			
12.0	EB300/30	11.97	16.14	12.61	11.08			
12.5	EB300/30	11.97	14.80	11.13	10.21			

Table based on one row of supports to 6m span, two rows up to 10m and 3 rows above.

ZED PURLIN AND RAIL HOLE PUNCHING DETAILS.

HEAVY END-BAY SYSTEM

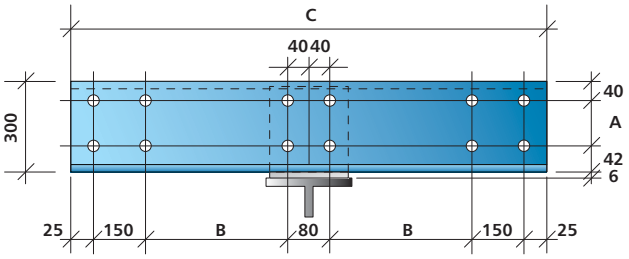
With this system, heavy gauge sections are used in the end bays and at penultimate support sleeves. Care must be taken to properly identify components on site to avoid misplacement. Usually end-bay purlins can be detailed
to be different from inner-bay sections but as sleeves
look similar at all positions consideration may be given
to using heavy gauge sleeve sections at all supports to avoid wrong positioning.

Dimensions in mm

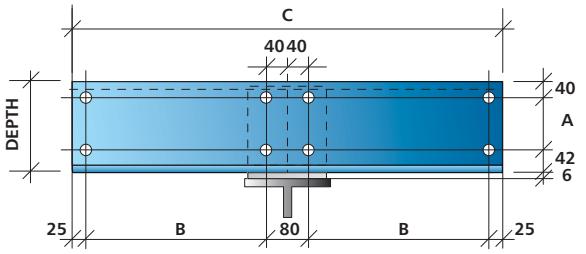
Depth	A	B	C
140	58	235	600
170	88	285	700
200	118	335	800
240	158	435	1000
300	218	435	1300

Note: All holes 14mm dia for M12 bolts, minimum grade 8.8 use a washer under all bolt heads and nuts in contact with sections or sleeves.

ZED SECTION SLEEVES



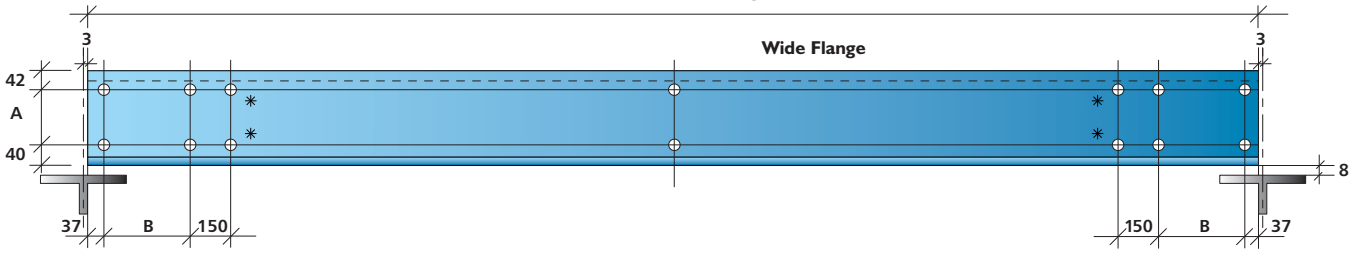
Sleeve for 300 Series



Sleeve for 140, 170, 200 and 240 Series

ZED PURLINS & RAILS

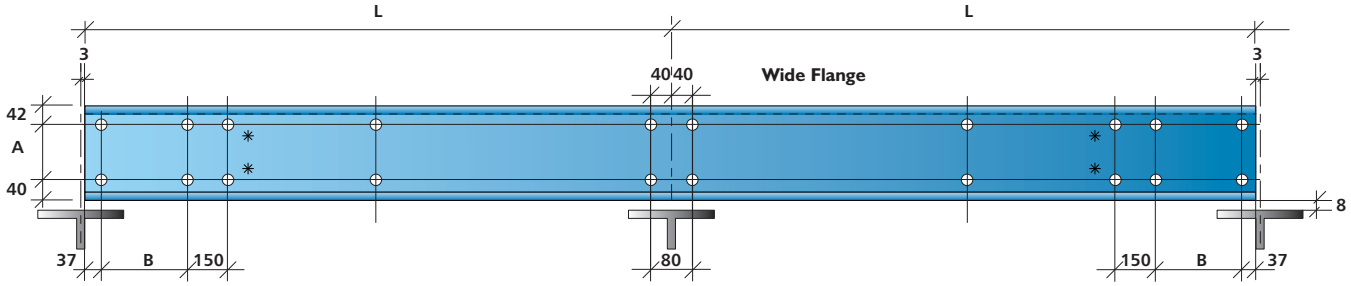
L=section length



Sag bar holing.
Purlins: Use holing at midspan for single row, at 3/8:1/4:3/8 span for double row.
Rails: Use holing at midspan for single row, at 1/3 spans for double row, 1/4 spans for triple row.

*** Additional holes required for 300 series sleeves only.**

Single Spans



Double Spans

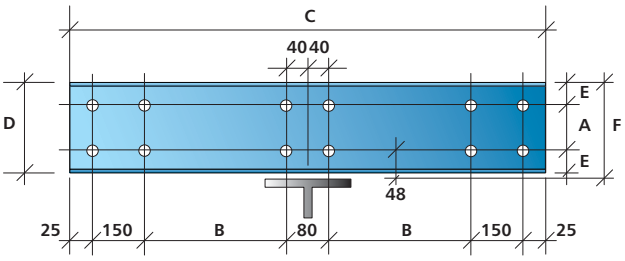
CEE RAIL HOLE PUNCHING DETAILS

Dimensions in mm

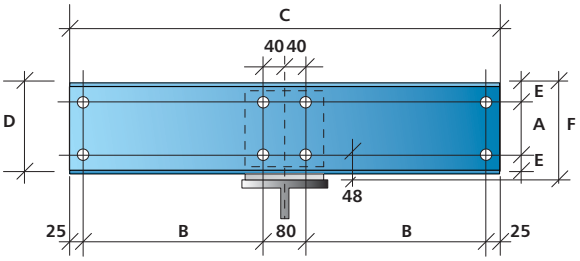
Rail Depth	Sleeve Thickness	A	B	C	D	E	F
140	2.0	58	235	600	146	44	150
170	2.5	88	285	700	177	44.5	180.5
200	2.5	118	335	800	207	44.5	210.5
240	3.0	158	435	1000	248	45	251
300	3.0	218	435	1300	308	45	311

Note: All holes 14mm dia for M12 bolts, minimum grade 8.8. Use a washer under all bolt heads and nuts in contact with sections or sleeves.

CEE SECTION SLEEVES



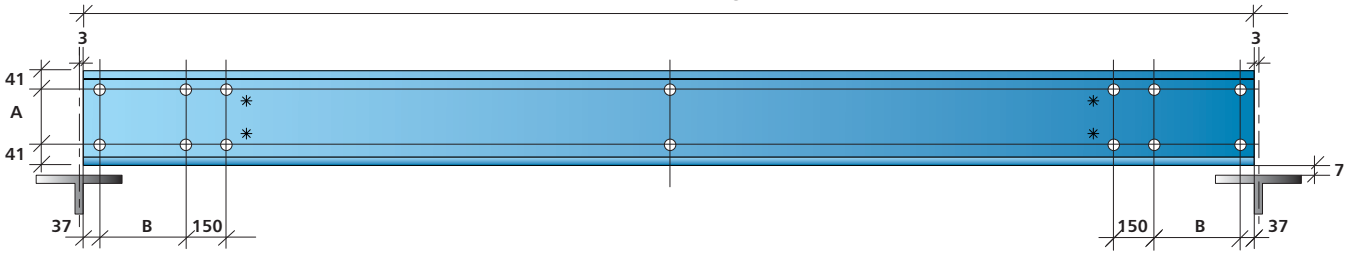
Sleeve for 300 Series



Sleeve for 140, 170, 200 and 240 Series

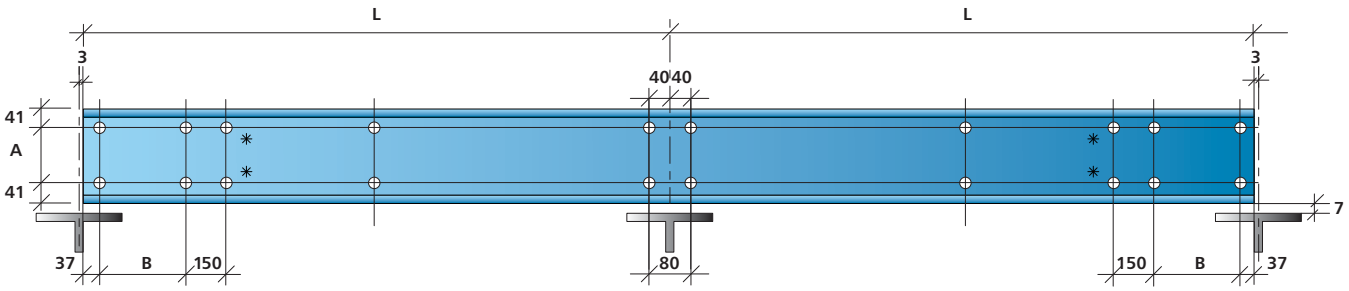
CEE SECTION RAILS

L=section length



Sag bar holing at midspan for single row, at 1/3 spans for double row. 1/4 span for triple row.

Single Spans * Additional holes required for 300 series sleeves only.



Double Spans

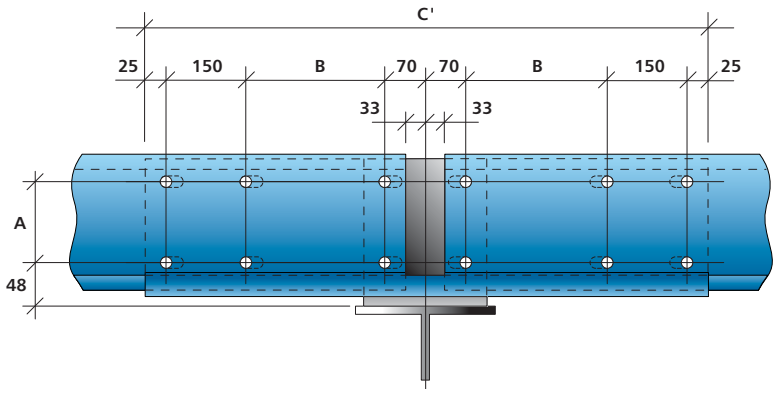
FIRE WALL RAIL PUNCHING DETAILS

ZED SECTIONS

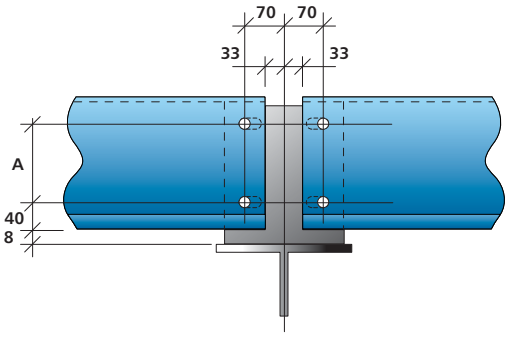
Dimensions in mm

Depth	A	B	C'
140	58	235	660
170	88	285	760
200	118	335	860
240	158	435	1060
300	218	435	1360

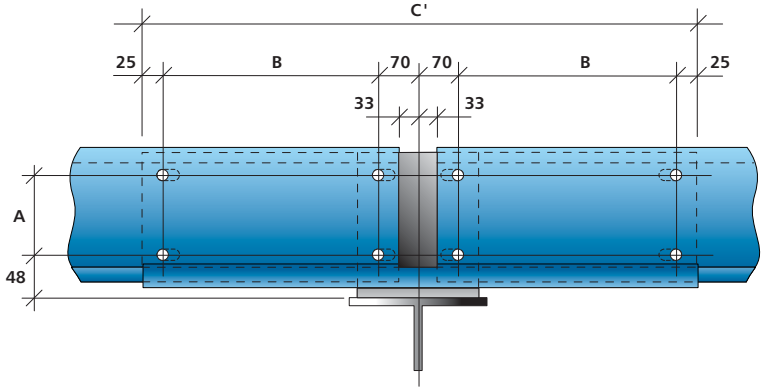
HOLE



Sleeved Zed Rail Connection for 300 Series



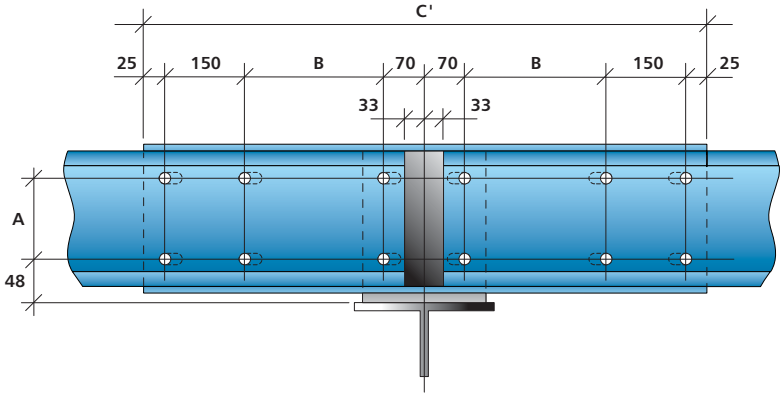
Butted Zed Rail Connection



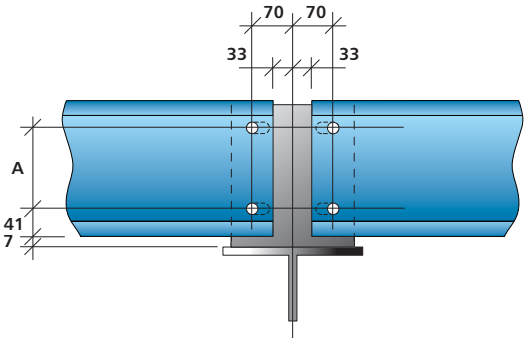
Sleeved Zed Rail Connection for 140 - 240 Series

CEE SECTIONS

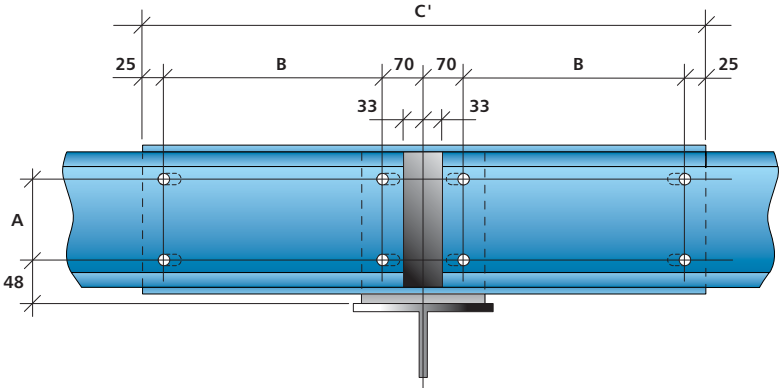
These details should be used in conjunction with information on page 24 and with cleats as detailed on page 48.



Sleeved Cee Rail Connection for 300 Series



Butted Cee Rail Connection



Sleeved Cee Rail Connection for 140 - 240 Series

STANDARD CLEATS FOR PURLINS & RAILS

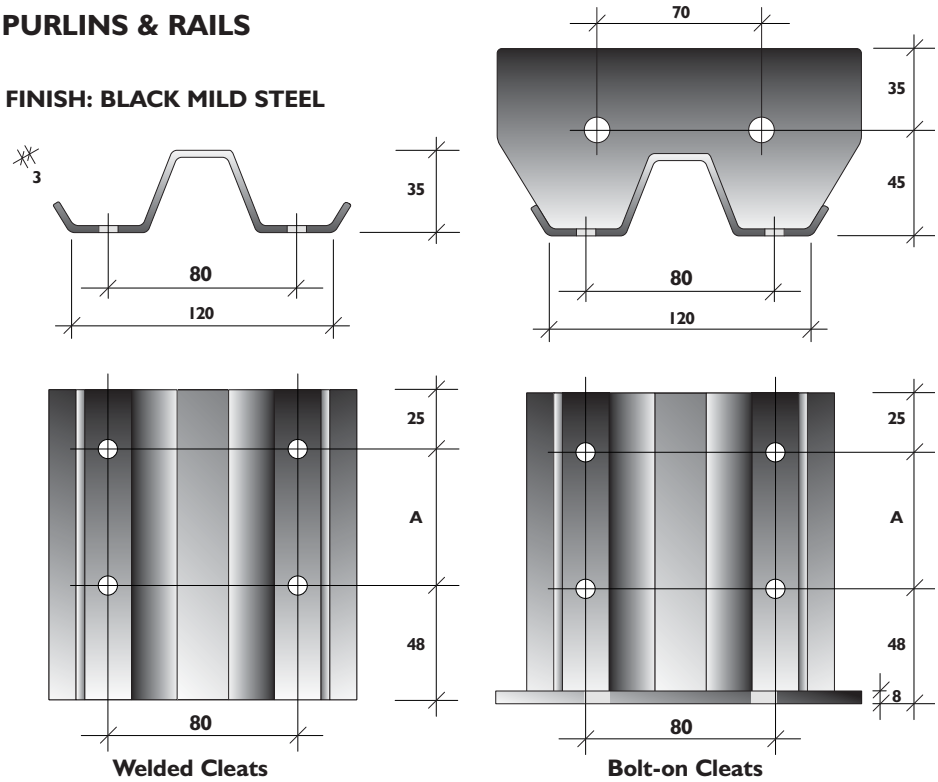
STANDARD FORMED CLEATS - FINISH: BLACK MILD STEEL

Note for formed cleats.

1.Holes in cleat upstand are 14mm dia for M12 grade 8.8 bolts.

2. Holes in base plate for bolt-on cleats = 18mm dia.

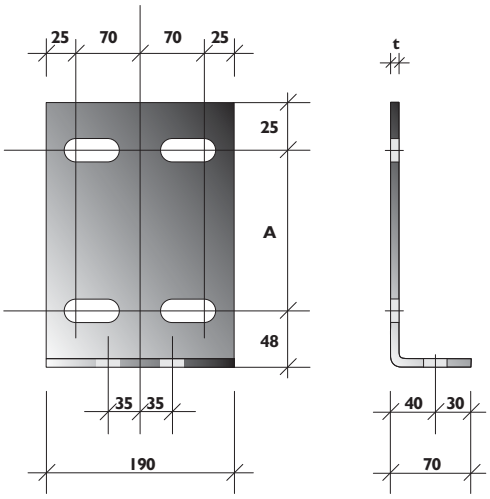
3. For very heavily loaded, steep roofs or heavy wall claddings, Steadmans can on request provide heavy duty cleats reinforced with welded stiffeners.



Welded Cleats

Bolt-on Cleats

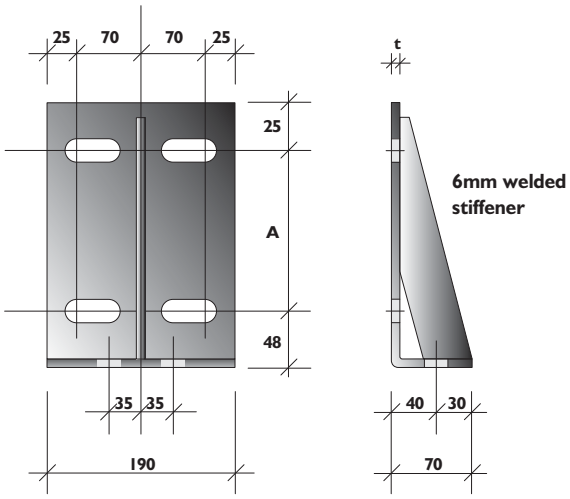
FIRE WALL CLEATS - FINISH: BLACK MILD STEEL



Normal Fire Wall Cleats

14mm dia x 45mm slots in long leg.

18mm dia x holes in short leg.



Heavy Duty Fire Wall Cleats

Note for fire wall cleats.

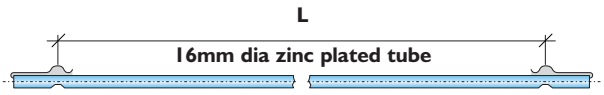
1. t=6mm for 140 to 200 series
t=8mm for 240 and 300 series

2. It is recommended that heavy duty cleats are used for all 300 series connections and for heavy cladding systems.

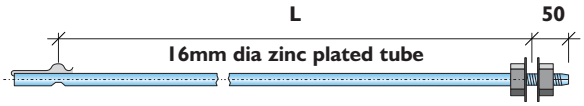
Dimensions 'A' (mm)

Section Depth	'A'
140	58
170	88
200	118
240	158
300	218

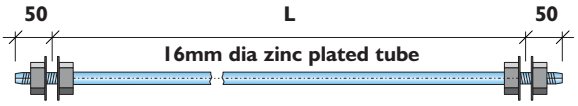
ANTI-SAG SYSTEM COMPONENTS



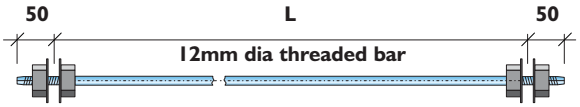
PUSH-FIT SAG BAR



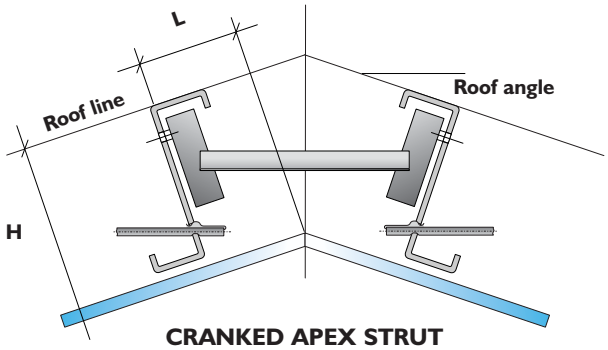
ADJUSTABLE SAG BAR



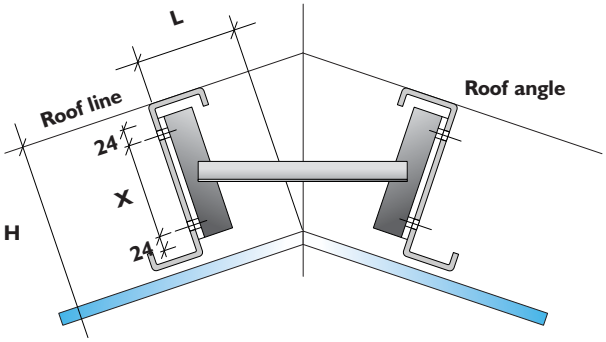
DOUBLE-ADJUSTABLE SAG BAR



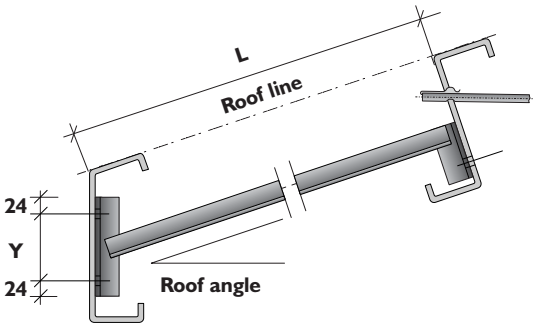
THREADED TIE ROD



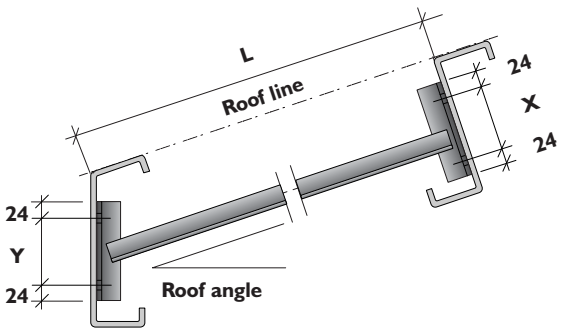
CRANKED APEX STRUT WITH PUSH-FIT SAG BAR



CRANKED APEX STRUT WITH ADJUSTABLE SAG BAR OR WITH ANGLE



EAVES BRACE WITH PUSH-FIT SAG BAR



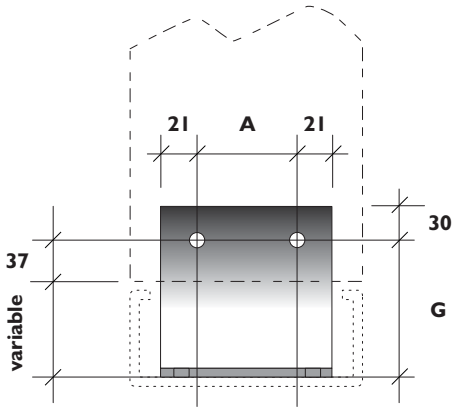
EAVES BRACE WITH ADJUSTABLE SAG BAR OR WITH ANGLE BRACES

GENERAL NOTES.

Note that the dimension X refers to the purlin and Y refers to the Eaves Beam. Anchor cleats should be placed at the holes above the rail strut end cleat (and nearest the sheeting) for a single sided diagonal tie position and under the rail strut cleat for a double sided diagonal tie position. The tie top fixing should be bolted to the cleat hole nearest the column.

Note: All holes 14mm dia for M12 bolts, minimum grade 8.8

CLEATS

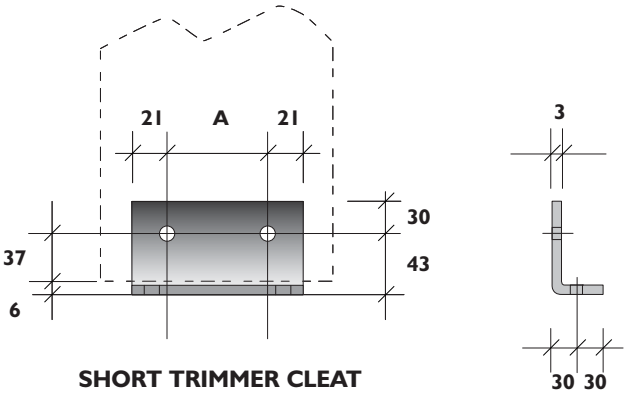


LONG TRIMMER CLEAT

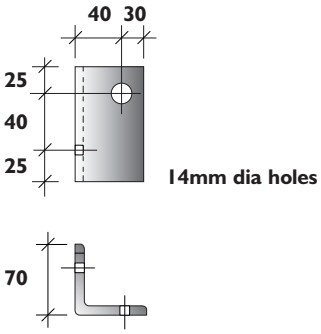
Dimensions in mm

Section Depth	A	G
140	58	110
170	88	110
200	118	110
240	158	125
300	218	135

Cleats fabricated from 3mm Galv Z35.
Holes 14mm dia for M12 grade 8.8 bolts.

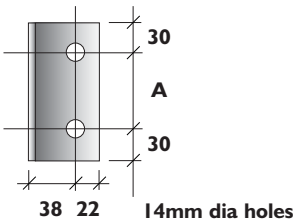


SHORT TRIMMER CLEAT



70x70x6mm angle

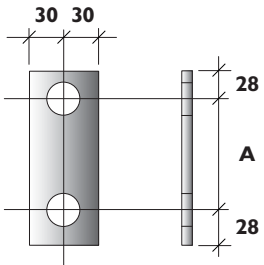
STAY CLEAT



60x60x2mm zinc plated steel

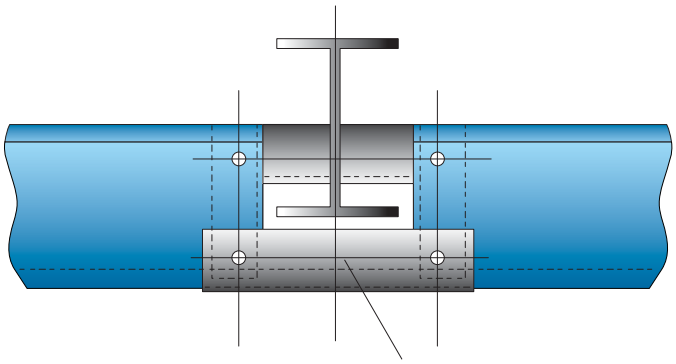
RAIL END CLEAT

MISCELLANEOUS COMPONENTS



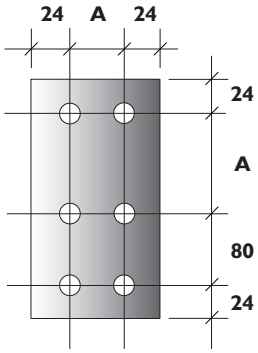
Galv 6mm thick
plate 28mm dia holes

PACKER PLATE AT COUNTERFORMED HOLES



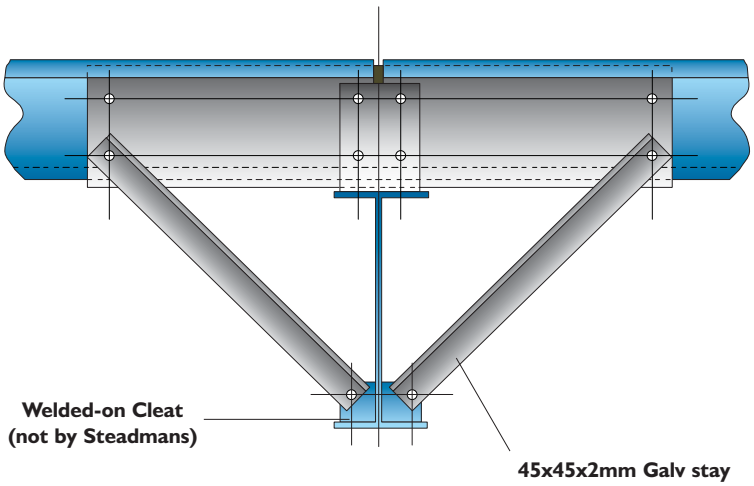
Rail closer from 45x70 Galv angle x 2mm thk

RAIL CLOSER DETAIL



Galv steel 3mm
thick 14mm dia holes

RAIL CORNER JOINING PLATE

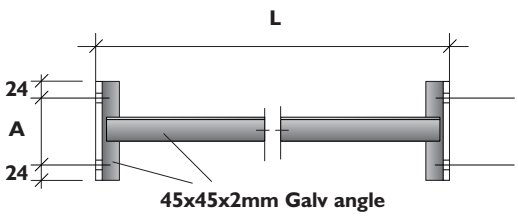


RAFTER AND COLUMN STAY DETAIL

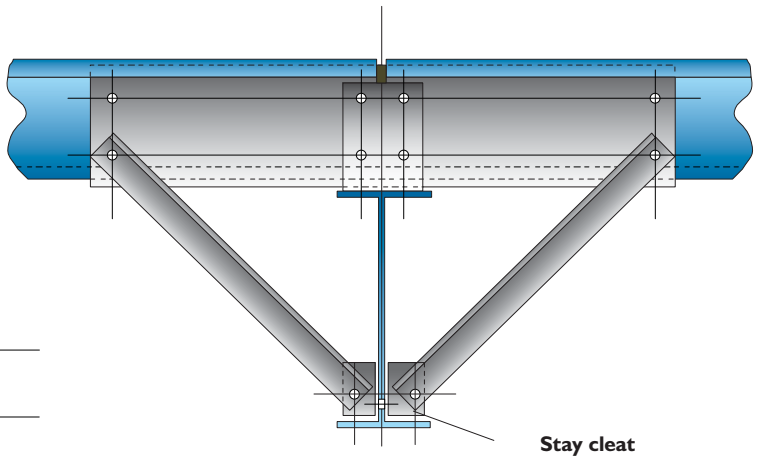
Dimensions in mm

Depth	A
140	58
170	88
200	118
240	158
300	218

Note: All holes 14mm dia for M12 bolts, minimum grade 8.8 (plated finish)



STANDARD ANGLE BRACE AND RAIL STRUT



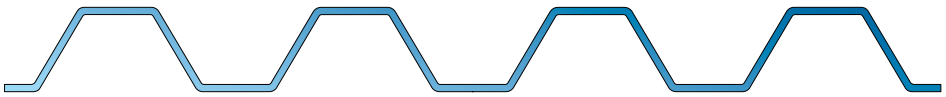
ALTERNATIVE STAY DETAIL (RAFTER AND COLUMN)

A. Steadman & Son Ltd • Warnell • Welton • Carlisle • CA5 7HH Tel (0169 74) 78 277 Fax (0169 74) 78530

Steadmans have the ability to brake-press a wide variety of customised sections to suit customers individual requirements.

Pressings may be up to 10m long and up to 3.0mm in thickness.

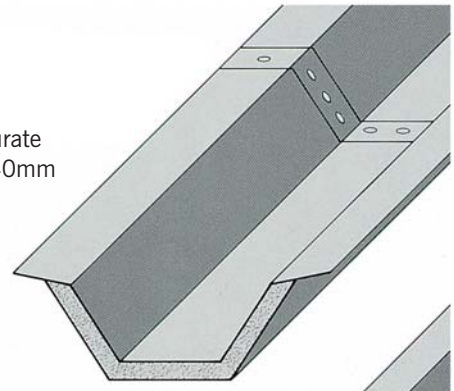
Some typical examples are indicated to illustrate the flexibility of this approach.



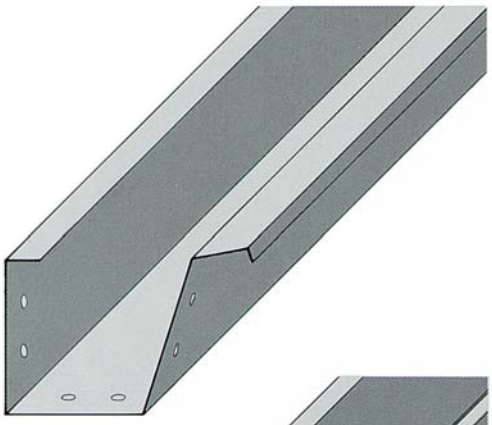
SHEET PROFILES TO MATCH OBSOLETE CLADDING

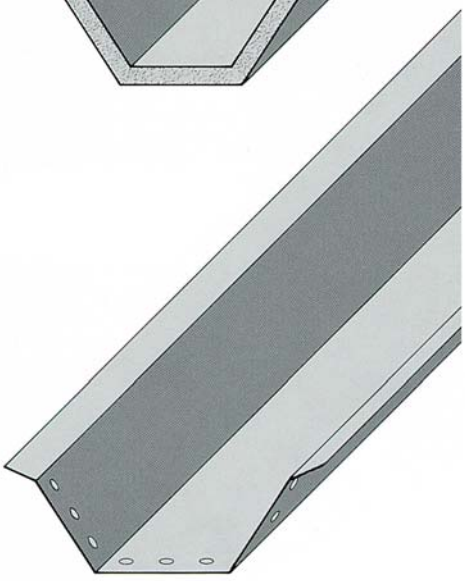
CUSTOM SECTIONS

COMPOSITE VALLEY GUTTER
Bonded Polyisocyanurate Foam Core:30mm, 40mm or 50mm thick

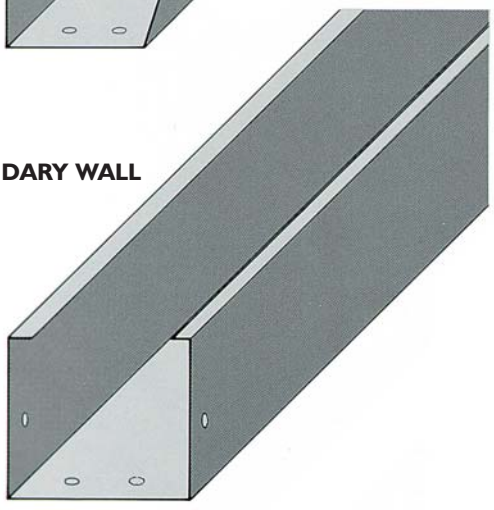


STRUCTURAL GUTTER





TYPICAL BOUNDARY WALL BOX GUTTER



TYPICAL VALLEY GUTTER
Available up to 1250mm in girth

Sign of Quality

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Cumbria
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Fax: 01697 478 530

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Houston Industrial Estate
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