

OVERVIEW

The choice between the Traditional and Long Strip roofing systems is largely one of appearance.

The Long Strip system uses a harder temper copper and this, being more rigid, is better able to accommodate the stresses of thermal movement, virtually eliminating the need for lateral joints. In addition, the extensive use of the automatic tools required to form harder copper makes the Long Strip system generally cheaper.

The so-called Traditional system is suited to more complicated work featuring details which can only be formed by hand, and therefore require the use of a softer temper copper. Sizes of copper sheet have to be restricted to dissipate the stresses of thermal movement. The regular repetition of the necessary lateral joints becomes a desirable element of the design.

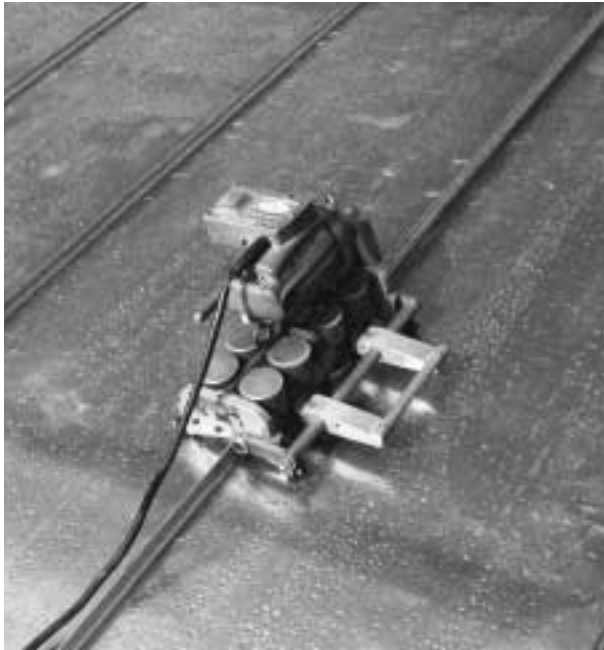


Traditional system at the London Planetarium

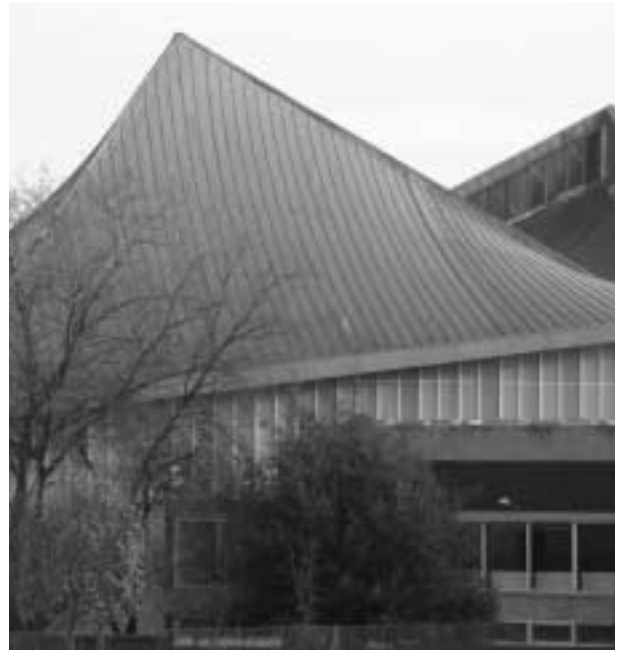
Table B

TRADITIONAL SYSTEM

<p>GENERALLY</p> <ul style="list-style-type: none"> • uses Soft or 1/4 Hard copper sheet • copper thickness 0.6mm or 0.7mm in exposed areas • chosen where details need hand-forming or where lateral joints are wanted for aesthetic reasons • final appearance of work more hand-finished with characteristic 'quilting' to bays • most roofing and cladding details are common to both the Traditional and the Long Strip systems but details for Long Strip allow more movement 	<p>LATERAL JOINTS</p> <ul style="list-style-type: none"> • for lateral joints four details are possible depending on roof pitch: 'double-lock cross welts': 'drip-steps': 'fillet drips': 'single-lock cross welts' (see Table F)
<p>BAY SIZES</p> <ul style="list-style-type: none"> • longitudinal and lateral joints are planned so that sizes of copper sheet do not exceed 600mm wide or 1800mm long • because the fixings possible to hold the copper to the substrate are related to bay widths exposure must be considered (see Tables M and N) 	<p>FIXINGS</p> <ul style="list-style-type: none"> • only 'fixed clips' are used at both longitudinal and lateral joints • in most detail locations clips are spaced at 300mm centres • for some details continuous fixing strips are used as this is easier than lining up separate clips • nails for all types of fixings are commonly 25mm x 2.6mm diameter annular ring-shanked nails with a minimum 6mm head • nailing for continuous fixing strips, eaves strips or lining plates is at 100mm staggered centres
<p>LONGITUDINAL JOINTS</p> <ul style="list-style-type: none"> • for longitudinal joints three details are possible depending on roof pitch: 'batten rolls': 'double-lock standing seams': 'angle standing seams' (see Table D) • for flat roofs possible damage from maintenance access might indicate the choice of 'batten rolls' 	<p>CLADDING</p> <ul style="list-style-type: none"> • basic roofing techniques using batten rolls and standing seams are also used for direct-fixed cladding of vertical surfaces and soffits



Mechanised seaming for the Long Strip System



Long Strip System at the Commonwealth Institute, London

Table C

LONG STRIP SYSTEM

<p>GENERALLY</p> <ul style="list-style-type: none"> • uses 1/4 or 1/2 Hard copper strip pre-formed into trays • copper thickness 0.6mm or 0.7mm in exposed areas • chosen for cost-effectiveness and where lateral joints are not wanted in the design • smoother and crisper appearance to finished work • most roofing and cladding details are common to both the Long Strip and the Traditional systems but details for Long Strip allow more movement 	<p>LATERAL JOINTS</p> <ul style="list-style-type: none"> • for lateral joints three details are possible depending on roof pitch: 'lap-lock cross welts': 'drip-steps': 'fillet drips' (see Tables K and L)
<p>BAY SIZES</p> <ul style="list-style-type: none"> • longitudinal joints are planned so that widths of copper strip do not exceed 670mm wide • lateral joints are planned to limit uninterrupted lengths of copper according to pitch (see Table L) • if a pattern of bays is required to suit the design unclipped double-lock cross welts can be introduced, but these will be in addition to the lateral joints required by Table L (see Fig. 15) 	<p>FIXINGS</p> <ul style="list-style-type: none"> • where lengths of copper strip do not exceed 3 metres 'fixed clips' may be used throughout • where lengths of copper strip exceed 3 metres longitudinal joints must incorporate both 'sliding clips' and 'fixed clips' in accordance with Table L • to allow for movement consistent with water-tightness, fixing at eaves, drip-steps and gutters involves the use of continuous copper eaves strips or lining plates • in most other detail locations clips are spaced at 300mm centres • for some details continuous fixing strips are used as this is easier than lining up separate clips • nails for all types of fixings are commonly 25mm x 2.6mm diameter annular ring-shanked nails with a minimum 6mm head • nailing for continuous fixing strips, eaves strips or lining plates is at 100mm staggered centres
<p>LONGITUDINAL JOINTS</p> <ul style="list-style-type: none"> • for longitudinal joints three details are possible depending on roof pitch: 'batten rolls': 'double-lock standing seams': 'angle standing seams' (see Table H) • for flat roofs possible damage from maintenance access might indicate the choice of 'batten rolls' 	<p>CLADDING</p> <ul style="list-style-type: none"> • basic roofing techniques using batten rolls and standing seams are also used for direct-fixed cladding of vertical surfaces and soffits

Joists for the Traditional system

Table D

LONGITUDINAL JOINTS – PITCH

JOINT DETAIL	Minimum roof pitch (degrees)				
	1	3	6	25	90
double-lock standing seams h25mm <i>a) sealed b) not sealed</i>					
angle standing seams h25mm x 12mm angle					
batten rolls h44mm x 44mm					
batten rolls h38mm x 38mm					
tapered batten rolls h38mm x 44mm to 32mm					
conical wood core rolls h48mm x 42mm to 10mm <i>now obsolete</i>					

Notes

1) Table D is to be read with Table F Lateral joints Pitch (see opposite), to derive the acceptable minimum pitch for any particular roof.

Table E

LONGITUDINAL JOINTS – BAY WIDTH

JOINT DETAIL	Spacing of longitudinal joints / Bay widths (at mm ctrs) according to standard sheet widths available (mm)							
	sheet widths							
	400	450	500	600	670*	700*	750*	800*
double-lock standing seams h25mm width loss to form joint: 75mm** **80mm using a profiling machine	325	375	425	525	595	625	675	725
angle standing seams h25mm x 12mm angle width loss to form joint: 75mm** **80mm using a profiling machine	325	375	425	525	595	625	675	725
batten rolls h44mm x 44mm width loss to form joint: 75mm	325	375	425	525	595	625	675	725
batten rolls h38mm x 38mm width loss to form joint: 70mm	330	380	430	530	600	630	680	730
tapered batten rolls h38mm x 44mm to 32mm width loss to form joint: 65mm	375	385	435	535	605	635	685	735
conical wood core rolls h48mm x 42mm to 10mm width loss to form joint: 155mm	245	295	345	445	515	545	595	645

Notes

1) Sheet widths marked thus '* are wider than recommended in normal circumstances.

Table F

LATERAL JOINTS – PITCH

JOINT DETAIL	Minimum roof pitch (degrees)								
	1	3	6	10	14	20	25	45	90
hand-formed double-lock cross welts 18mm <i>a) sealed b) not sealed</i>			a) ●	-----		b) ●	-----	-----	-----
pre-formed double-lock cross welts 18mm <i>a) sealed b) not sealed</i>			a) ●	-----		b) ●	-----	-----	-----
drip-steps h50mm (standing seams) <i>a) with sealed standing seam b) where pre-formed straight dog eared upstand is used</i>		a) ●	-----				b) ●	-----	-----
drip-steps h60mm <i>a) tapered or b) 38 x 38mm batten rolls</i>	a) ●	b) ●	-----						-----
drip-steps h65mm <i>(44 x 44mm batten rolls)</i>	●	-----							-----
fillet drips h50mm x w250mm (standing seams) <i>a) where pre-formed straight dog-eared upstand is used</i>					●	-----	a) ●	-----	-----
single-lock cross welts 30mm <i>(2no clips in welt per bay)</i>							●	-----	-----
single-lock cross welts 18mm <i>(2no clips in welt per bay)</i>								●	-----

Table G

LATERAL JOINTS – BAY LENGTH

JOINT DETAIL	Spacing of lateral joints / Bay lengths (at mm ctrs) in typical detail locations using sheet length at maximum (mm):
	1800
hand-formed double-lock cross welts 18mm length loss to form joint: 75mm	1725
pre-formed double-lock cross welts 18mm length loss to form joint: 85mm	1715
drip-steps h50mm (standing seams) length loss to form joint: 100mm	1700
drip-steps h65mm (44 x 44mm batten rolls) length loss to form joint: 115mm	1685
fillet drips h50mm (standing seams) length loss to form joint: 100mm	1700
single-lock cross welts 30mm length loss to form joint: 95mm	1705
single-lock cross welts 18mm length loss to form joint: 60mm	1740

Notes

1) Previous guidance allowed drip-steps to be spaced at 3 metre intervals. However this is no longer recommended and a maximum sheet length of 1800mm is now considered the best practice. If it is difficult to provide drip-steps to this standard, and the pitch allows (see Table F above), a combination of drip-steps and sealed double-lock cross welts might be considered. Alternatively the Long Strip details shown in Figs 4e, 4f, 41a, or 41b (see pages 27 and 96) could be used for drips at 3 metre centres (see also Table L note 7).

Joints for the Long Strip system

Table H

LONGITUDINAL JOINTS – PITCH

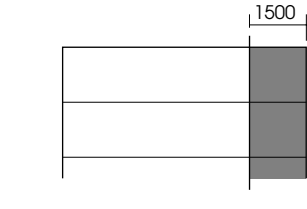
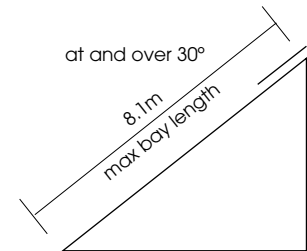
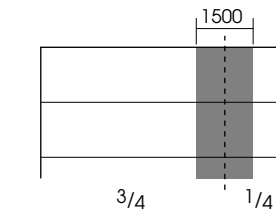
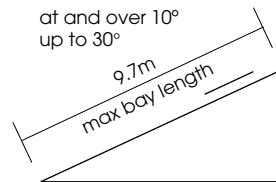
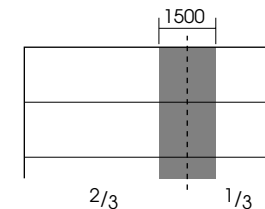
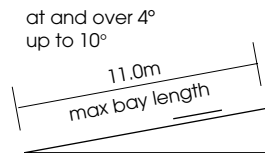
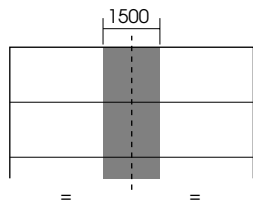
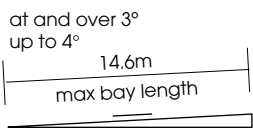
JOINT DETAIL	Minimum roof pitch (degrees)			
	3	6	25	90
double-lock standing seams h25mm a) sealed b) not sealed				
angle standing seams h25mm x 12mm angle				
batten rolls h44mm x 44mm				
batten rolls h38mm x 38mm				
tapered batten rolls h38mm x 44mm to 32mm				

Table L

BAY LENGTH AND FIXINGS

key

= fixed clip zone



Notes

- 1) A zone of fixed clips is necessary on a Long Strip roof to prevent the copper from elongating over time. This tendency to elongate increases with roof pitch and with bay length. Previous design guidance recommended a maximum bay length for Long Strip roofing of 10 metres, applicable regardless of roof pitch.
In addition, hot weather causes compressive forces in the copper as it tries to expand. The zone's position is varied according to roof pitch. This achieves a balance in the copper tray between the compressive forces created as the bay expands upwards from the zone against gravity; and those created in overcoming frictional resistance as it expands downwards from the zone.
- 2) For illustrations of fixed and sliding clips with Double-lock standing seams, refer to Figs 1 and 2 (p18).
- 3) For illustrations of fixed and sliding clips with Batten rolls, refer to Fig 37 (p88).
- 4) Fixed clips are to be provided at 300mm centres in the shaded area, the 'fixed clip zone'. Dimensions shown are taken in the plane of the roof slope. Below 3degrees all clips can be sliding clips.
- 5) With Double-lock standing seams at roof pitches at and over 45degrees, fixed clips are to be provided at 250mm ctrs in the 'fixed clip zone'.
- 6) Sliding clips are to be provided at 300mm ctrs in the unshaded areas.
- 7) For small roofs with slopes not exceeding 3 metres or where movement joints are provided at 3 metre centres, fixed clips may be used throughout.
- 8) Table L applies to both double- and mono-pitched roofs.
- 9) If any transport and site handling problems can be overcome, it might be possible to increase the maximum bay lengths shown. This will require the use of a special sliding clip ('safety clip') and 0.7mm half-hard copper. Special details to accommodate the increased movement might also be needed. Contact the CDA Roofing Technical Officer for further information.

Table K

LATERAL JOINTS – PITCH

JOINT DETAIL	Minimum roof pitch (degrees)				
	3	10	14	25	90
lap-lock cross welts 250mm length loss to form joint: 370mm at sheet top: 335mm at sheet foot: 35mm					
drip-steps h50mm (standing seam) length loss to form joint: 115mm at sheet top: 80mm at sheet foot: 35mm <i>a) where pre-formed straight dog-eared upstand is used</i>					
drip-steps h60mm (tapered or 38 x 38 batten rolls) length loss to form joint: 120mm at sheet top: 85mm at sheet foot: 35mm					
drip-steps h65mm (44 x 44 batten rolls) length loss to form joint: 125mm at sheet top: 90mm at sheet foot: 35mm					
fillet drips h50mm x w250mm (standing seam) length loss to form joint: 115mm at sheet top: 80mm at sheet foot: 35mm <i>a) where pre-formed straight dog-eared upstand is used</i>					

Table J

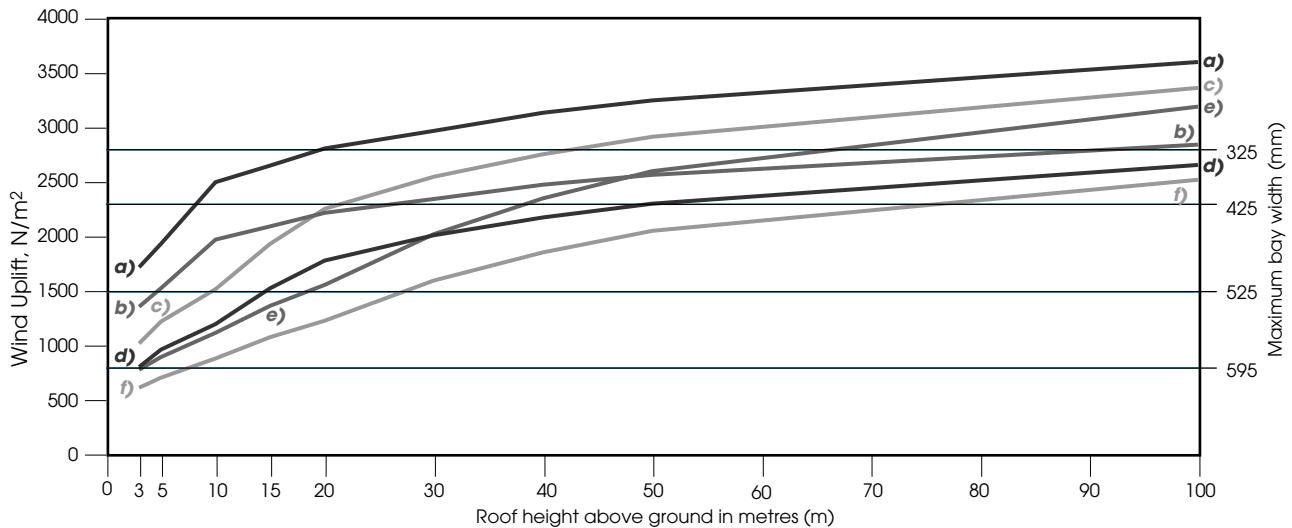
LONGITUDINAL JOINTS – BAY WIDTH

JOINT DETAIL	Spacing of longitudinal joints / Bay widths (at mm ctrs) according to standard sheet widths available (mm)				
	sheet widths				
	400	450	500	600	670
double-lock standing seams h25mm width loss to form joint: 75mm* *80mm using a profiling machine	325	375	425	525	595
angle standing seams h25mm x 12mm angle width loss to form joint: 75mm* *80mm using a profiling machine	325	375	425	525	595
batten rolls h44mm x 44mm width loss to form joint: 75mm	325	375	425	525	595
batten rolls h38mm x 38mm width loss to form joint: 70mm	330	380	430	530	600
tapered batten rolls h38mm x 44mm to 32mm width loss to form joint: 65mm	335	385	435	535	605

Bay width in relation to exposure

Table M

FOR 0.6MM THICKNESS COPPER

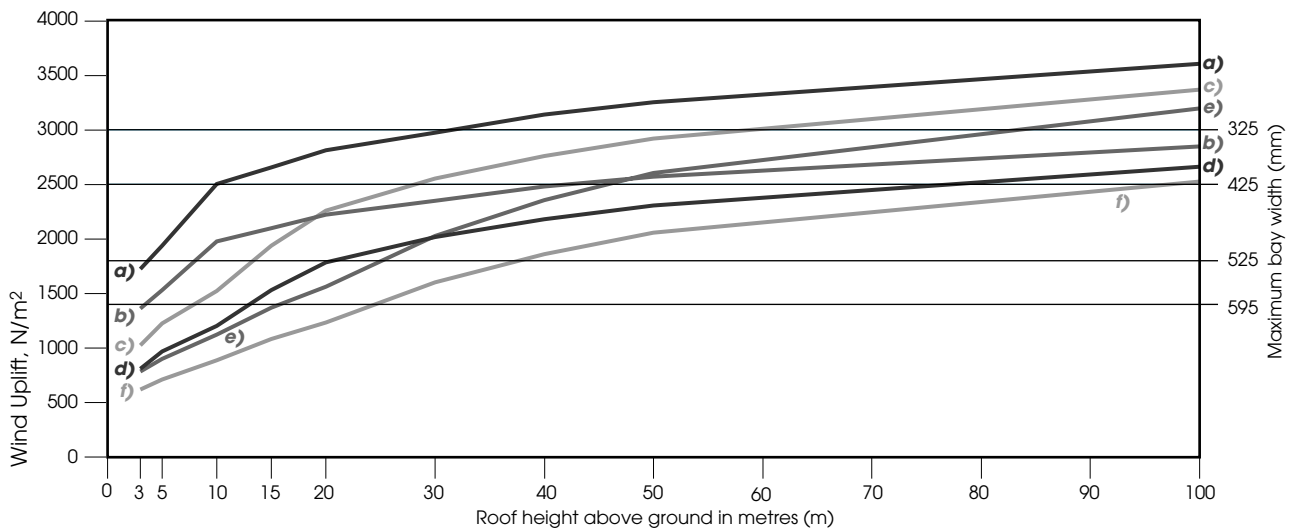


Key for tables M and N

- a) = Scotland and Northern Ireland, exposed conditions**
- b) = England & Wales, exposed conditions**
- c) = Scotland and Northern Ireland, normal conditions**
- d) = England & Wales, normal conditions**
- e) = Scotland and Northern Ireland, sheltered conditions**
- f) = England & Wales, sheltered conditions**

Table N

FOR 0.7MM THICKNESS COPPER



Notes

- 1) Tables M and N apply to both the Traditional and Long Strip systems.
- 2) The bay widths shown may be maintained at all parts of the roof. Reduced bay widths, for example, are no longer required at verges.
- 3) The Tables have been compiled from data obtained from a number of the UK's most experienced specialist roofing contractors. The information was obtained on the basis of CP3 Chapter V: Part 2: 1972 Wind loads and was subject to some simplifying but conservative assumptions. Thus wider bay widths might be possible in central southern England, especially in conurbations or large towns.
- 4) CP3 Chapter V: Part 2 has been replaced by BS6399: Part 2: 1997 Code of practice for wind loads.
- 5) Nails for all types of fixings are commonly 25mm x 2.6mm diameter annular ring-shanked nails with a minimum 6mm head.
- 6) In comparison with previous published guidance, the excellent pull-out strength of the now widely used annular ring-shanked nails has made simpler specification of fixings possible, and applicable to all exposures (see Tables B and C).
- 7) The effect that the degree of exposure has on the number of fixings required has been accounted for in the maximum bay widths allowable.
- 8) No clip in a longitudinal joint should be positioned within 75mm of its intersection with a single-lock or double-lock cross welt.

Table P

PITCHED VALLEY GUTTERS

VALLEY DETAIL	Suitable for roofing in / with				Minimum roof pitches (degrees)	Notes Possible lateral joints as listed on Table T shown thus: A B etc
	Traditional	Long Strip	Standing Seam	Batten Roll		
recessed into substrate	yes	yes	yes	yes	4½	See Figs 30 (p78) and 52 (p118) A B C D E F G
with tilting fillets	yes	yes	yes	no	13½	See Fig 31 (p80) B C D E F G
with standing seam edges	yes	no	yes	no	10* or 3	See Fig 32 (p81). The minimum pitch* assumes the gutter exceeds 3m and so needs a cross welt. C E F G
with lap-lock welts to gutter lining edges	yes	yes	yes	no	10	See Fig 33 (p82) B C D E F G
with single-lock welts to gutter lining edges	yes	no	yes	no	25	See Fig 34 (p83) C D E F G

Notes

- 1) Table P assumes that the gutters are approximately 300mm wide and that they drain roof pitches at and over 10degrees. If for some reason they exceed 400mm or are at a lower pitch, refer to the Copper for Roofing section.
- 2) Where the detailing of the pitched valley gutter linings allows them to move freely, a movement joint must still be provided so that no section exceeds 10 metres in length.
- 3) To prevent the gutter lining from creeping down the fall, some sort of 'fixed' clips will be required (see Table L).
- 4) Where the detailing of the pitched valley gutter linings prevents them from moving, a lateral joint must be provided so that no section exceeds 3 metres in length. Such a joint need not be a movement joint. Its purpose is to limit the size of the copper sheet.

Table T

MOVEMENT / LATERAL JOINTS IN GUTTERS

JOINT DETAIL <i>** those shown thus are not movement joints</i>	Minimum gutter pitches (degrees)
A drip-steps h60mm	3
B vulcanised neoprene strips	6
C hand-formed double-lock** cross welts 18mm - sealed	7
D lap-lock cross welts 250mm	10
E hand-formed double-lock** cross welts 18mm - unsealed	20
F single-lock cross welts 50mm	30
G single-lock cross welts 30mm	45