BE SAFE - BE SURE

SAFETY CHECKLIST

Before Commencing Erection

1. Is supporting scaffold completed in accordance with the design and ready to receive the roof ?
2. Is the correct equipment on site ?
3. Is the equipment in good working order ?
   - check Fixing Beam Timber inserts for quality and old nails removed
4. Have you got the right tools?
   - Power Drill & Drill Bit Adaptor (5/16")
   - Claw Hammer
   - Nail Pouch
   - Nails or Industrial Stapler
   - Tape Measure
   - Superfix Knife

   Only carry tools necessary for the job in hand
5. Have you got a copy of the design drawing ?
6. Have you got the appropriate safety equipment ?
   - Fixed length, double lanyard harness
   - Inertia Reel harness
   - Walking Boards & GuardRails
   - Kneeling Pads
   - Rescue procedure in place
7. Have you considered ?
   - number of erectors
   - designated tasks
   - starting position for erection
   - distribution of equipment

Health and Safety at Work Act, 1974

Haki equipment is designed to meet the requirements of the above Act, Section 6.
It is also the customer's responsibility to comply with the requirements of this Act, particularly to use the equipment in accordance with current codes of practice and in ensuring that components are in good working condition prior to each use.
We are able to provide assistance and advice on matters relating to safe and proper use of HAKI equipment.

HAKI®

SPECIALISTS IN SCAFFOLDING AND WEATHER PROTECTION SYSTEMS

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Tamworth, Staffordshire. B77 5BY
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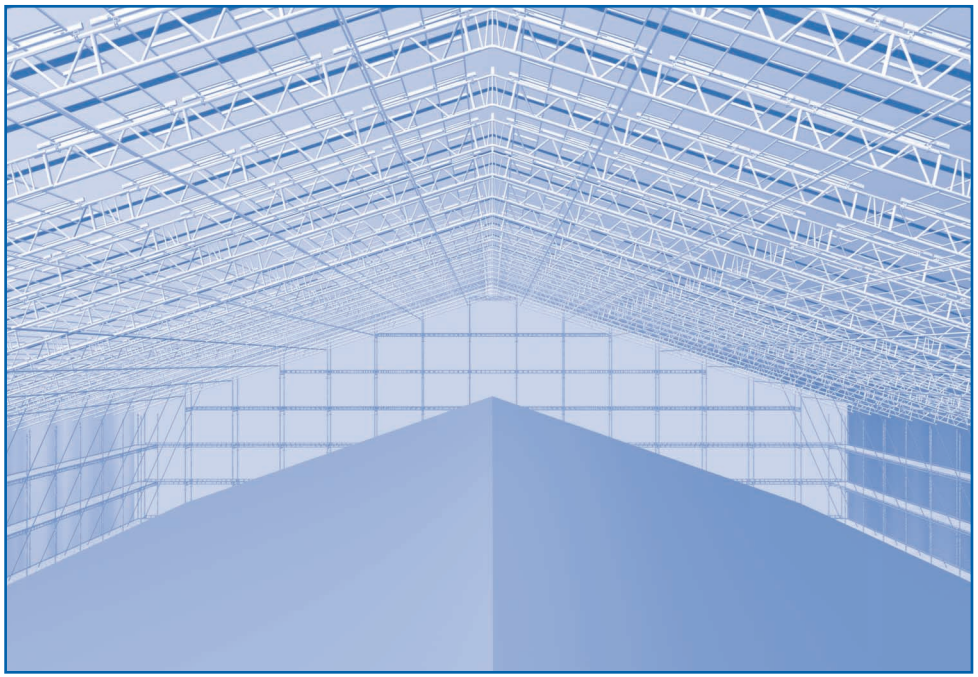
HAKI®

HAKI hakitec

TEMPORARY ROOF SYSTEM ERECTION MANUAL



INTRODUCTION

Temporary roof structures are by their very nature amongst the most difficult and demanding scaffolding assemblies.

Whilst HAKITEC provides a more efficient alternative to traditional equipment, HAKI believes that only trained and competent operatives should be allowed to erect the system.

Given this high degree of skill and experience, this booklet sets out safe, efficient methods for erecting HAKITEC.

Apart from installation of the equipment itself, a SYSTEM requires a SYSTEMISED approach to erection, which may be quite different to previous work methods.
Having the right number of operatives and designating specific work tasks is important to achieving efficiency.

This edition incorporates the experience of users throughout the UK.

At HAKI, we continually strive for improvement and welcome constructive comments.

WARNING

ALL INFORMATION CONTAINED IN THIS MANUAL APPLIES ONLY TO COMPONENTS MANUFACTURED AND SUPPLIED BY HAKI.

ANY COMPONENTS ORIGINATING FROM OTHER SOURCES WHICH ARE INCORPORATED INTO A STRUCTURE WILL INVALIDATE THIS INFORMATION.
IN SUCH CASE, HAKI HAS NO PRODUCT LIABILITY.

BY MIXING COMPONENTS OF OTHER MANUFACTURE THIS MAY INVALIDATE INSURANCE POLICY COVER.

Published April 2002
subject to change
Customers' responsibility to check for changes

TECHNICAL INFORMATION

Load Capacity for HAKI Aluminium Truss

Permissible Bending Moment	**15.7**	**kN.m**
Permissible Shear Force	**12.7**	**kN**
Permissible Point Load	**7.5**	**kN**

In order to attain the permissible loads stated above, it will be necessary to laterally restrain the compression chords of the aluminium beams.

For **sagging** conditions (bending downward),
the upper compression chord is restrained by means of the transverse purlin frames.

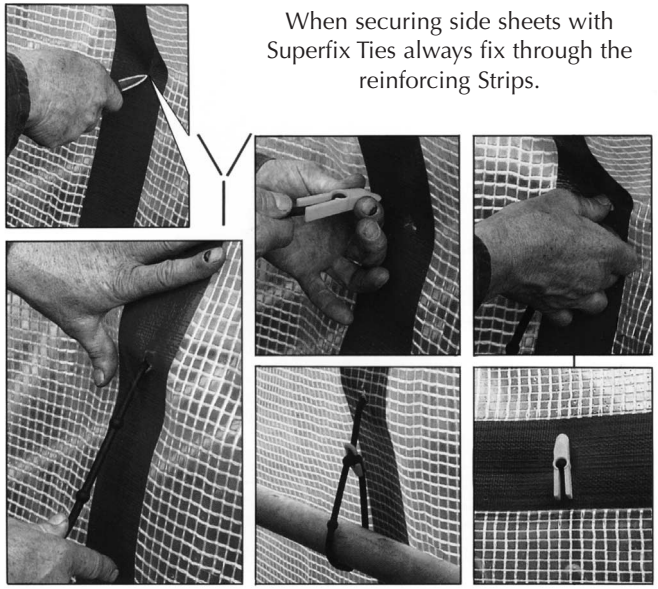
For **hogging** conditions (bending upward - under influence of wind loading),
the lower chord has to withstand compression.
It will be necessary to provide lateral restraint, normally by means of tubes and couplers.
The recommended maximum spacing of these lacing tubes is 2.4m.
To ensure that the lacing tubes provide restraint, it will be normally be necessary to fit plan braces. These would normally be fixed in end bays and a frequency of 1 bay in 5 between.

It is recommended that lacing tubes are approximately 300mm longer than the module size.
eg., for 3.05m bay - use 11' tube.
Then the protruding ends of tubes may be conveniently used to facilitate erection of the next truss.

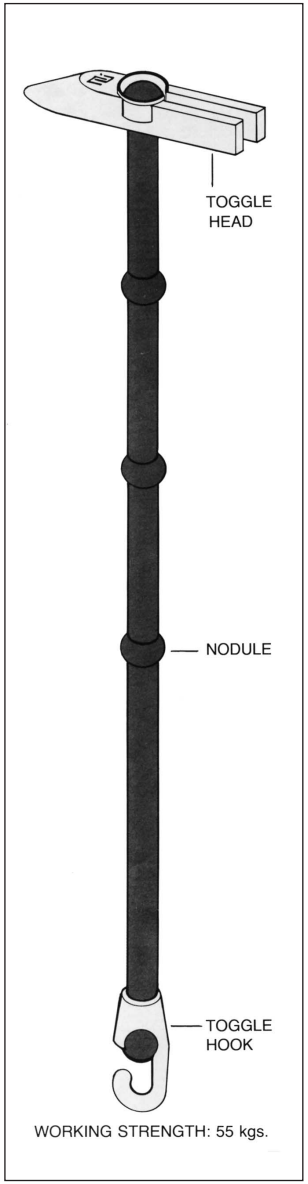
Seek advice if anything is unclear

SUPER FIX TIE

When securing side sheets with Superfix Ties always fix through the reinforcing Strips.



Cutting Tool



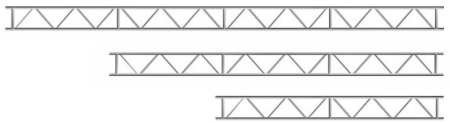
WORKING STRENGTH: 55 kgs.

Fixing Procedure

1. The Super-Fix cutting tool is a triple sided blade providing the correct size of hole for the Super-Fix toggle head.
2. The Super-Fix head positioned for insertion into the pre-cut hole.
3. The Super-Fix head is pushed through to the outside of the weather protect sheet.
4. The rubber part of the toggle is then pulled forcing the head into the correct position.
5. Finally the rubber is stretched round the appropriate tube and locked into position, on one of the nodules.
6. Toggle in position.
7. **RECOMMENDED TOGGLE FREQUENCY = 1 EVERY SQUARE METRE**

HAKI ROOF COMPONENTS

ALUMINIUM BEAMS



8.1m	4032810	33,00 kg
6.1m	4032610	25,00 kg
4.1m	4032410	15,00 kg

SHEETING

HAKITEC	30m x 3.3m WIDE	2744601	30,5 kg
HAKITEC	50m x 3.3m WIDE	2743601	62,0 kg
TIES		2994704	,025 kg

CONNECTOR FRAMES

30° FRAME	7203300	11,6 kg
15° FRAME	7203100	11,6 kg
STRAIGHT FRAME	7203200	8,2 kg

ROLLING ROOFS

ROLLING ROOF WHEEL	2591316	16,8 kg

SPRING CLIPS	2113000	0,07 kg
PIN FOR FIXING BEAM	9092391	0,14 kg

PURLIN RAILS

3m	8722300	11,0 kg
2.45m	8722250	9,2 kg
1.6m	8742160	6,4 kg

PURLIN FRAMES

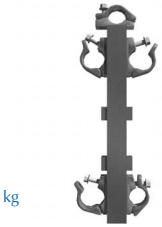
3m	7052300	14,9 kg
2.45m	7052245	13,9 kg
1.6m	7052160	10,5 kg

EAVES RAIL ADAPTOR	2511291	1,5 kg
GUARDRAIL POST ADAPTOR	2511289	4,5 kg

HAKI ROOF COMPONENTS

FIXING BEAMS

1.9m	2511221	8,6 kg
0.95m	2511231	7,0 kg
0.5m	2511251	4,8 kg



DOUBLE TRUSS CLAMP 2563100 12,5 kg

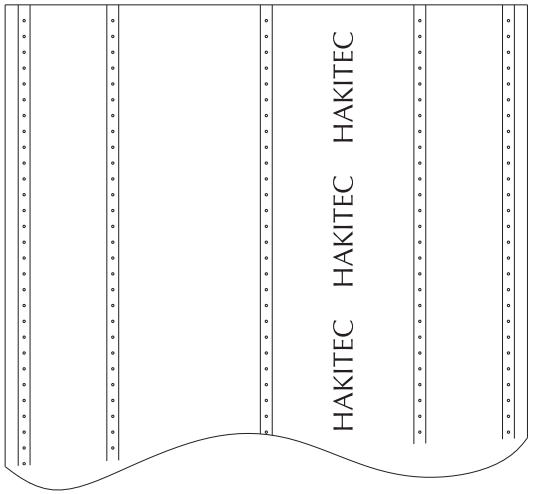
FIXING PLATE 2591201 4,5 kg
FIXING SCREWS 2591252 1,8 kg
200 PACK

GUARDRAIL POST 7015100 4,9 kg

WALKING BOARD 1.9 x 0.6m 2525235 16 kg

SHEETING BRACKET (PAIR) 2994706 6 kg

HAKITEC 320



CONSTRUCTION

WARP:	type	-	PP multifilament
	dtex	-	1100
	yarns/10cm	-	2 x 10
WEFT:	type	-	PP multifilament
	dtex	-	1100
	yarns/10cm	-	18
FILM:		-	UV stab. LDPE / EVA polymer
		-	thickness 280µ
WEIGHT:		-	301 gr/m² (excl. strips)
STRIPS:		-	Quality R567 transp. (HDPE) coated blue (LDPE)

TECHNICAL DETAILS

STRENGTH:	warp:	-	0,75 kN/50mm +/- 15%
	weft:	-	0,65 kN/50mm +/- 15%
STRENGTH OF BINDER/STRIP SYSTEM:		-	depending on bindertype
		-	for example binder with elastic strips breaks at ca. 0,75 kN +/- 15%
TEMPERATURE RANGE:		-	- 40°C / + 75°C
LIGHT TRANSMISSION:		-	60
THERMAL CONDUCTIVITY:		-	LDPE 8 x 10E-4 (cal/sec.cm.°C)
		-	LDPE = inknown in literature
FLAME POINT:		-	LDPE = 350°C (ASTM 1929)
		-	flame ignition LDPE = 340°C
		-	auto ignition in air LDPE = 400°C

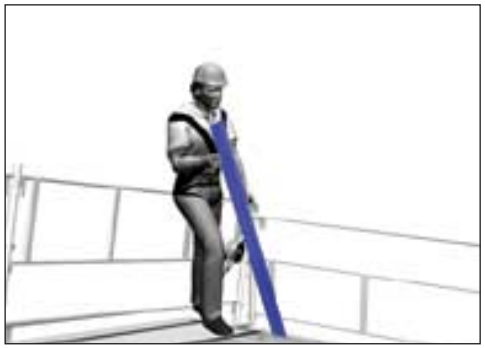


Figure 44

At Gable End, 3rd man ascends onto Walking Board using inertia reel harness clipped to the Guardrail Post.

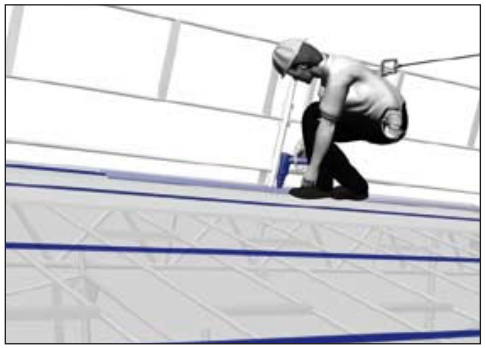


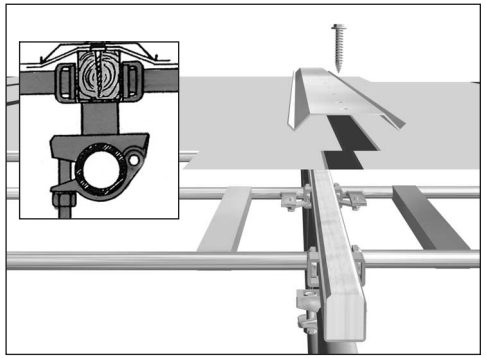
Figure 45

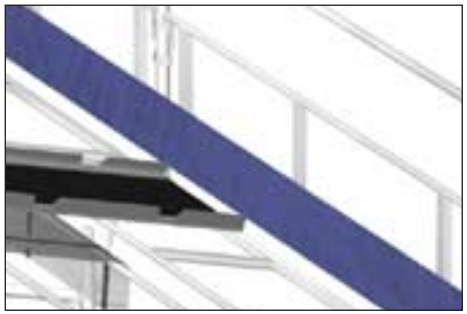
Fixing Plates and tools are then passed up from scaffold and 3rd man starts to install Fixing Plates.
These should be secured with a minimum of 7 screws (Evenly spaced) per fixing plate.

This process is repeated up to the Ridge.

At the Ridge, the sheeting is progressively rolled down the opposite slope and fixed as figures 42-45.

The procedure from figures 39 to 45 is repeated for each bay along roof. When Walking Board is used on top of the sheet, it should be turned upside down.



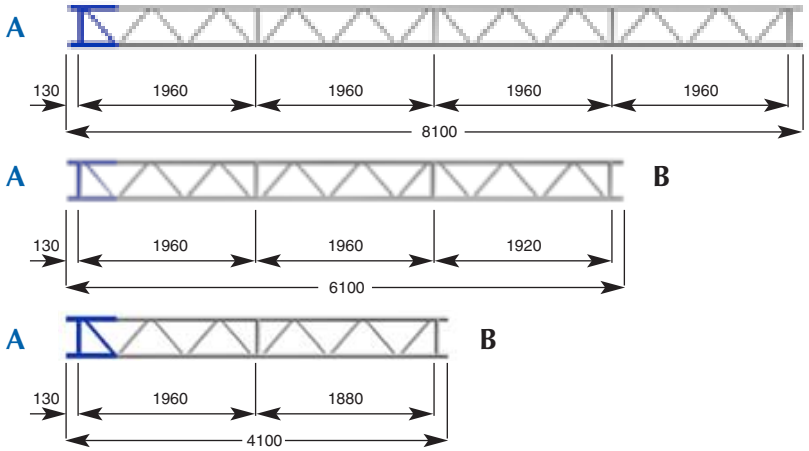


FOR DISMANTLING BOTH SHEETING AND FRAMEWORK, THE REVERSE OF THE ABOVE PROCEDURES SHOULD BE FOLLOWED.

PREPARATION

Aluminium Beam

A. Always put this end to the ridge (Yellow coded I.D. Tape)



ERECTION TIP
Note - 8,1m Beams are Symmetrical. 6,1m & 4,1m Beams have a Left and Right Hand.

Figure 1

FIXING BEAMS

1.9m is the most popular size.
(0.95m and 0.5m Fixing Beams are for infill or make up.)

By looking at the component you will see the position of the half Coupler is further in at one end thus creating a "long end".

It is important to have Fixing Beams as close as possible to the ridge.

Ensure that "long" end is positioned to the ridge.

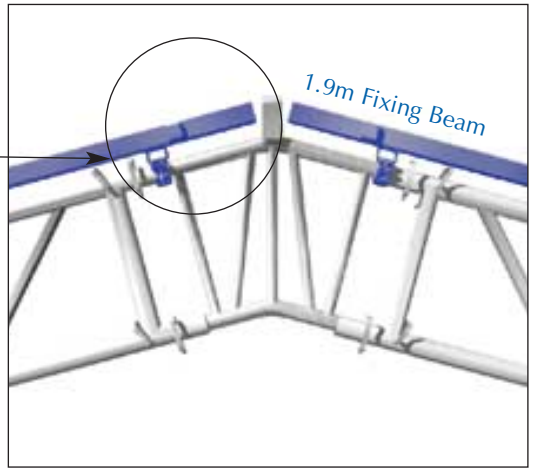


Figure 2

BEFORE RAISING INTO POSITION

As you will be erecting the framework from **EAVES TO RIDGE**, it is necessary to pre-determine the positions of Fixing Beams along the Beam. Lay one half of the complete Truss on the ground and position first Fixing Beam at the Ridge butting them together - and finally marking off the Aluminium Beam to determine the position of the first Fixing Beam at the 'eaves'.

NB. Should the Couplers on the 1.9m Fixing Beam clash with the struts of the Aluminium Beam, simply turn it around.

Figure 3

NOTE: Do not attach fixing beams to connector frames as these have smaller diameter tubes.

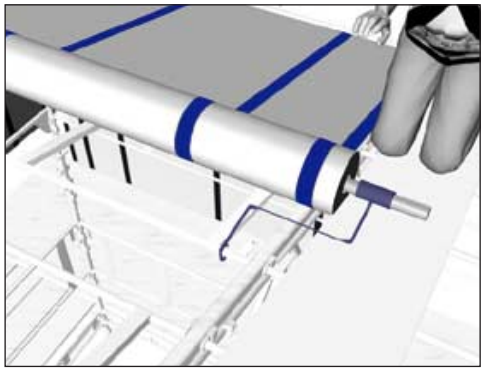


Figure 41

A 3.6m (12') tube is passed through the core of the roll and Sheeting Brackets are fitted at each end of the tube.
Sheeting Brackets can then be clipped onto purlin frames and progressively moved up to ridge and sheeting is secured to fixing beams

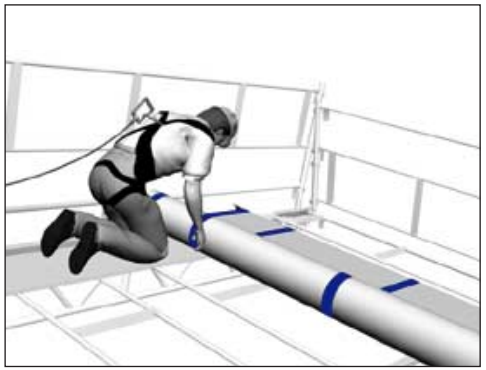


Figure 42

The Sheet is unrolled to a maximum of 3m, squared off and tacked down using roofing nails or heavy duty staples.

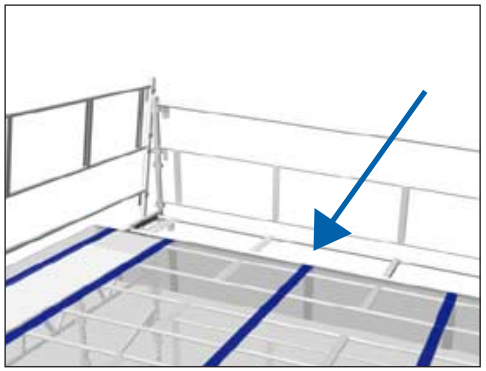


Figure 43

Note - sufficient sheeting to allow side cover is temporarily tucked down to allow the safe access of men and materials to the roof from the scaffold platform below.

ONLY CARRY THE TOOLS YOU REALLY NEED !
eg Nail/Screw Pouch, Suitable Power Screwdriver etc

(4) SHEETING

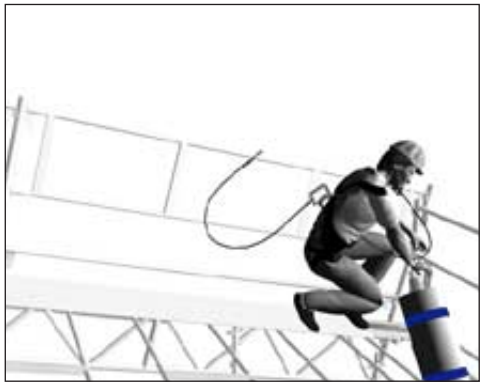
BEFORE SHEETING CAN COMMENCE, ALL NECESSARY LACING, BRACING ETC., MUST BE FITTED TO THE ROOF SYSTEM IN ACCORDANCE WITH THE DESIGN DRAWING(S)

SHEETING OPERATION SHOULD NOT BE CARRIED OUT IN ADVERSE WEATHER CONDITIONS

The roof system should be accessed only by using Walking Boards positioned adjacent to the trusses.

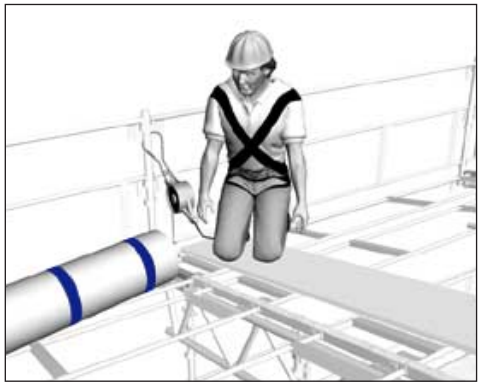
Under **NO** circumstances is it permitted to walk on or across the framework without Walking Boards ⚠

Figure 39



At the End (gable) Truss, the operative will work from Walking Board with front & rear double lanyard clipped to Guard Rail system.
At the gable position, the Walking Board is left in place to be sheeted over.

Figure 40



At intermediate Trusses, the operative will work from Walking Boards with inertia reel harness fixed to Guard Rail Post.
A roll of sheeting is raised into position from scaffold platform.

(1) ASSEMBLY OF TRUSS

Before starting work on the HAKITEC roof, ensure that the scaffold is erected in accordance with design and relevant risk assessment and method statement.
The following procedures start with erection of a typical HAKITEC roof from a gable end position.

The scaffold illustrated is fully decked and guardrailed on all faces (preferably no more than 2m below the Hakitec roof line at the eaves). A table lift is erected, fully guardrailed on all faces and with adequate ladder access. If a gable scaffold is not provided, a suitable access platform should be erected from the existing roof to facilitate this erection procedure (this platform is part of the scaffold risk assessment and method statement)

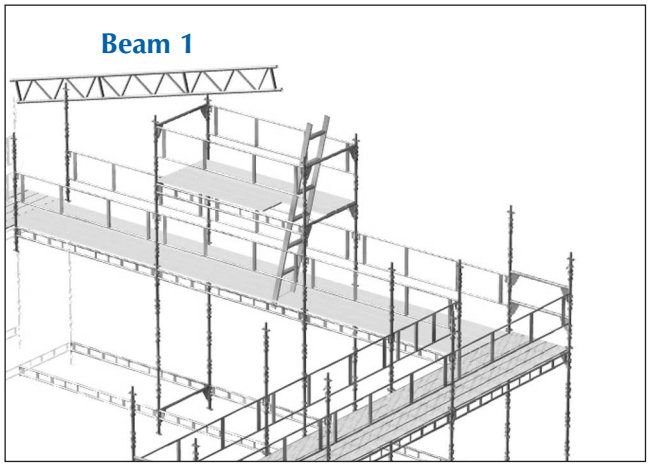
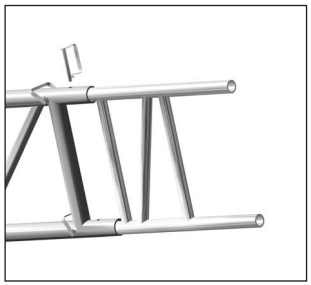
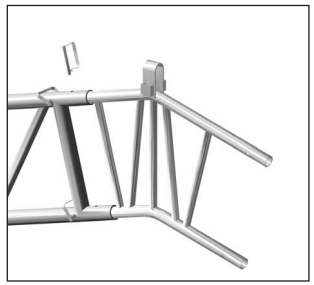


Figure 4

Temporarily fix Aluminium Beam 1 to side scaffold and rear edge of table lift of the gable scaffold.





Insert the Ridge and any Straight Connector Frames and retain with Spring Clips (8 per connection)
Note - Spray Connector Frame with WD40 or similar for easy fit.
Never FORCE connection by striking Aluminium Beams.

Figure 5

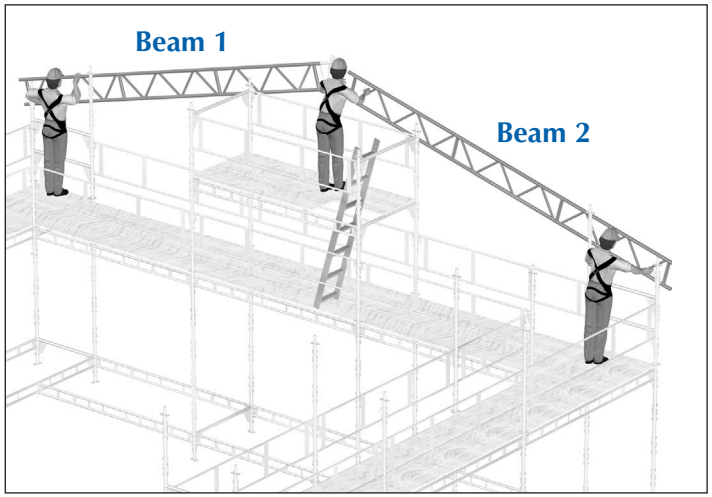


Figure 6

After fitting Ridge (and/or Straight Connector Frames), add Aluminium Beam 2.

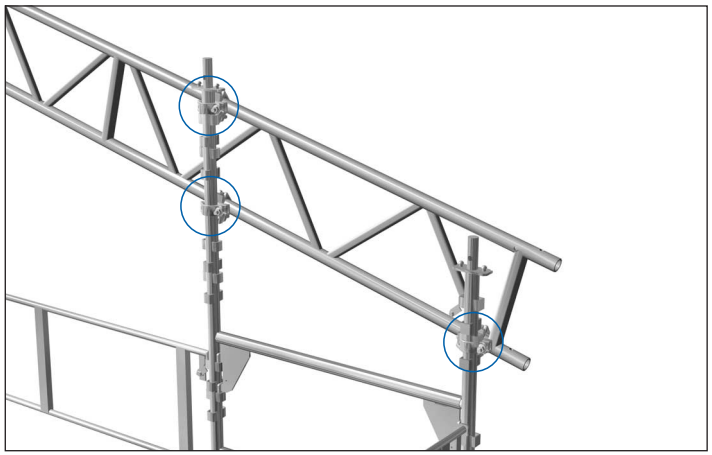


Figure 7

The Complete Truss assembly can now be connected to the side scaffold using a minimum of 3 scaffold couplers at each truss end.

Note - Always use the same type of coupler for connecting Trusses to scaffold eg. Drop-Forged or Pressed - ie. DO NOT MIX DROP-FORGED AND PRESSED COUPLERS.

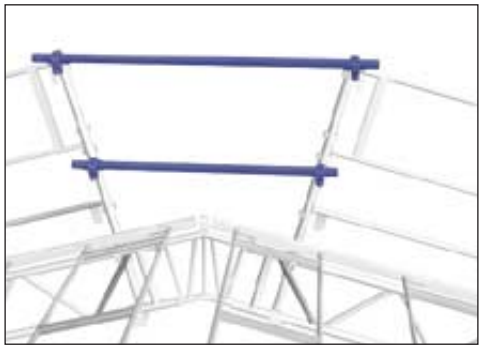


Figure 36

At the ridge, Guard Posts are linked using appropriate tube and fittings to form make-up Guard Rails.

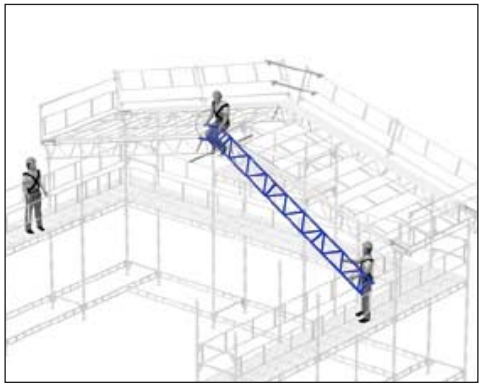


Figure 37

For successive bays, assembled truss is temporarily fixed to extended lacing tubes using double couplers.

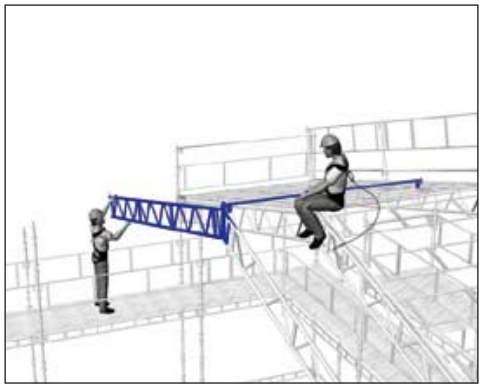


Figure 38

Then truss is manoeuvred into position (using purlin rail) with one man securely located on the ridge.

Successive bays are erected using the same procedure as first bay. See Fig.18 onwards

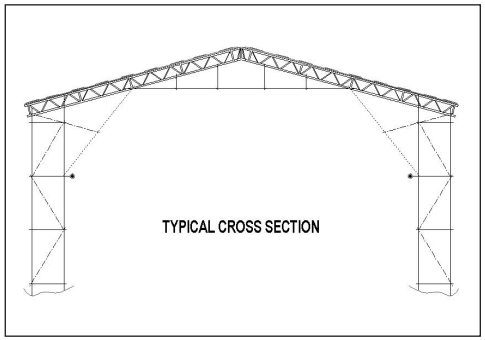


Figure 33

If the Design requires Knee Braces, these can be safely fixed at this stage.

Figure 34

If the design requires Chord Ties, then these can be safely fixed by operatives experienced in standard procedures for suspended scaffolding.
Remember, always be clipped to Aluminium Beam.

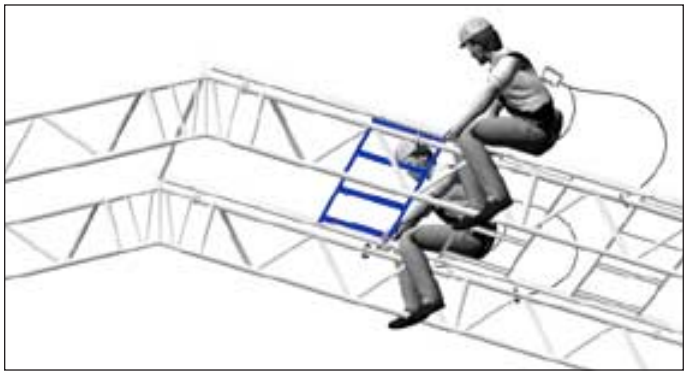


Figure 35

Fitting of subsequent Purlin Frames and Fixing Beams is carried out by repeating the procedure from Fig 26.

Erection sequence of frames must only be carried out **UPWARDS FROM EAVES TO RIDGE.**
NEVER DOWN THE SLOPE.
EACH BAY IS TO BE COMPLETED BEFORE COMMENCING THE NEXT.
Walking Boards are placed progressively as shown for passage of materials.

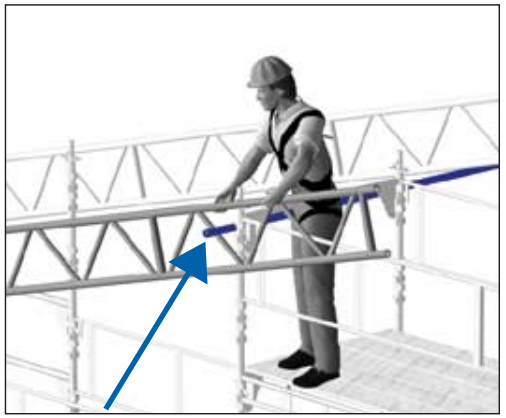


Figure 8

Assemble Truss 2 using the same procedure as Truss 1, BUT, fixing to front edge of table lift.
A tube is connected to the table lift scaffold for the Aluminium Beam to rest upon during connection sequence.

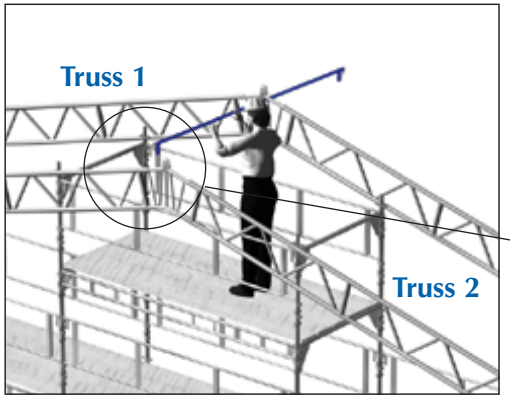


Figure 9

Connect Purlin Rail into the pocket of the Ridge Connector in Truss 2.

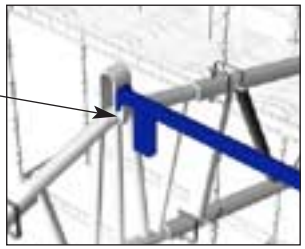


Figure 10

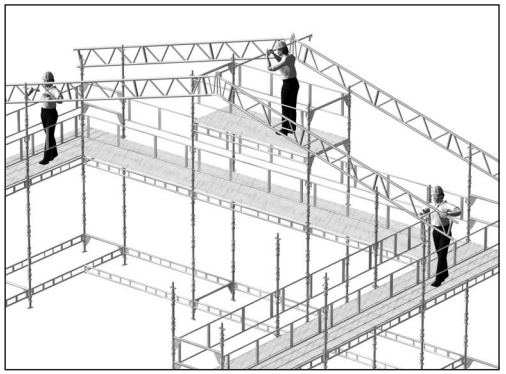


Figure 11

Manoeuvre Truss 2 into position and connect other end of Purlin Rail into pocket of the Ridge Connector of Truss 1.

(2) EAVES EDGE PROTECTION

Figure 12

Working from the safe area of the side scaffolding, fit Eaves Rail Adaptor into the end of the top Truss Chord, and secure with a Spring Clip

Figure 13

Still working from the safe area of the side scaffolding, Purlin Rail is then fitted into adaptor

AT THIS POINT, IT IS IMPORTANT TO CHECK THAT THE FIRST BAY IS SQUARE using appropriate plan brace - see Table below

	Plan Brace Length (m) - Centre to Centre		
Bay Length	First Beam 4.1m	First Beam 6.1m	First Beam 8.1m
2.5m	3.128 (RED)	3.152 (YELLOW)	3.177 (BLACK)
3.05m	3.583 (BLUE)	3.604 (GREEN)	3.625 (BROWN)

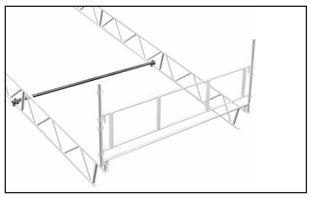


Figure 14a

Fix temporary lacing tube to lower chords of trusses to ensure that trusses are vertical

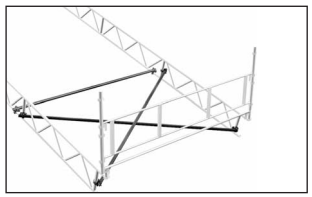


Figure 14b

Fit pair of Plan Braces to square trusses

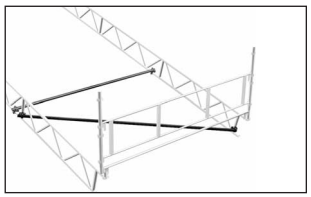


Figure 14c

One of the crossed braces may be removed for use elsewhere as specified by the Design Drawing

Figure 15

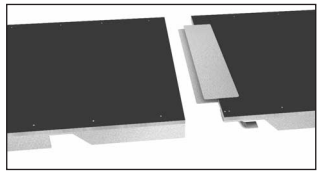
Before proceeding further, it is esssential that a safety harness be worn with a double lanyard **clipped off the top chord of the Aluminium Beam.**

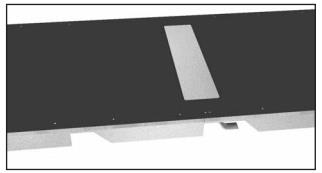
Guard Rail Post is fitted into Eaves Rail Adaptor and Locking Screw tightened.

Figure 29

When materials can no longer be passed from the side scaffold, Walking Boards are passed up, then placed alongside Aluminium Beams.

ALL MATERIALS MUST NOW BE TRANSPORTED FROM SCAFFOLD VIA WALKING BOARDS
Maximum Loading on Walking Board 1 man + 2 components.





The Haki Walking Boards are designed to hook on to the Purlin Frames and securely lock together end to end.

Any operative carrying materials along walking boards will be tied to Guard Rail Post with inertia-reel harness.

Walking Boards must not be laid farther than the erected gable guard rail or at the leading edges.

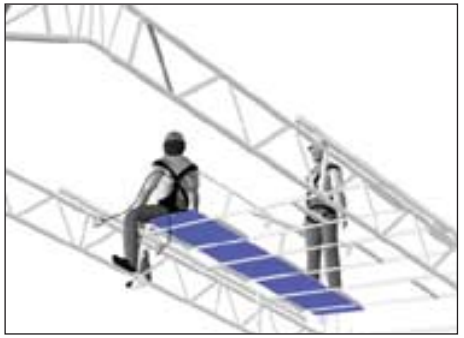


Figure 31

Whilst the operative working at gable edge fits Guard Post Adaptor the third operative will have his inertia reel attached, then ascend to walking board level, where he will pass components to operatives framing out.

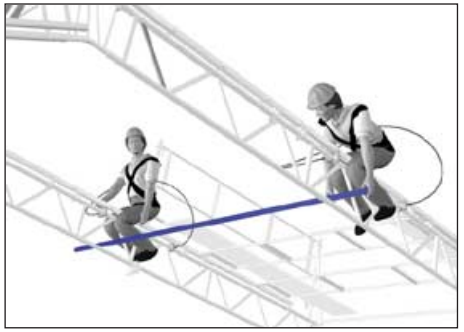


Figure 32

Bottom Chord Lacing is fitted progressively at spacing according to Design Drawing using scaffold tube and couplers.
This should extend 300mm into next bay.

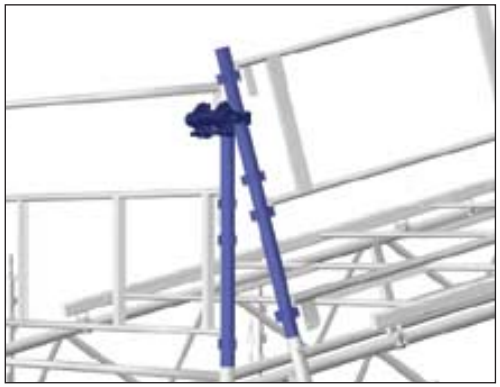


Figure 26

Connection between eaves and gable Guard Rail Posts may not be a precise dimension, Guard Rail Posts are linked using appropriate tube and fittings to form make- up Guard Rails.

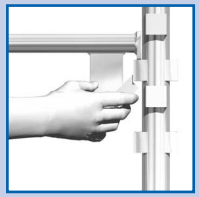
Figure 27

Hook on to truss, climb up and straddle Aluminium Beam.

Next Fixing Beams and Purlin Frames are passed up from side scaffold to operative.

Figure 28

Next Purlin Frame is fitted into fixing beam and upper coupler tightened.
Engage locking catches.



IMPORTANT

ENGAGE LOCKING CATCHES AS EACH COMPONENT IS FIXED.

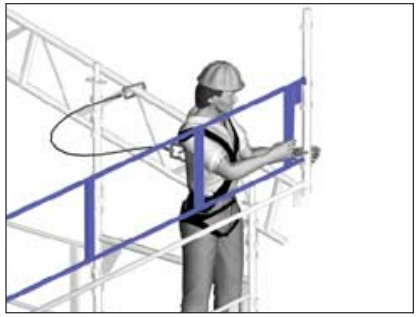


Figure 16

Whilst harnessed to Truss, fit Purlin Frame into lower set of pockets of Guard Rail Post.

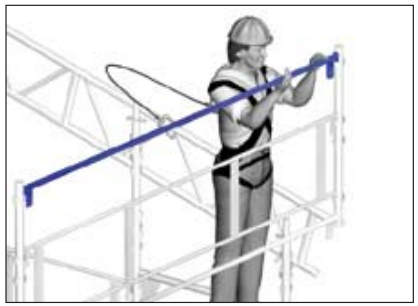


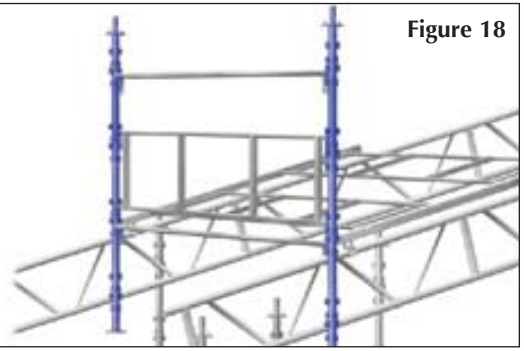
Figure 17

Purlin rail is then fitted into upper pockets of Guard Rail Post.

ALTERNATIVE EDGE PROTECTION

- If finished edge of roof is part way up the Truss - a 2m HAKI Standard can be fixed to Aluminium Beam with Swivel Couplers to provide a Guard Rail Post, at the required position.

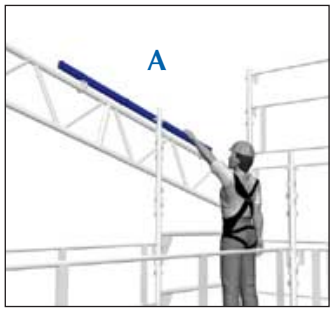
Figure 18



(3) FRAMEWORK

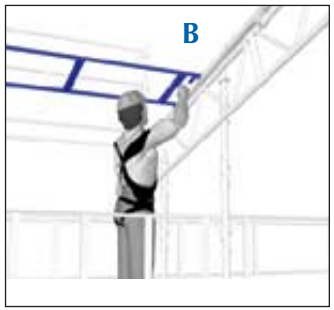
Working from the safe area of the side scaffolding, starting at the pre-determined setting-out point (Page 6), place first Fixing Beams on Trusses.

Figure 19



Ensure Fixing Beam is vertical at all times.
Tighten lower coupler of A.
Locate First Purlin Frame into A + B.
Engage Locking Catches.
Ensure all is square.
Tighten lower coupler of B.

Figure 20



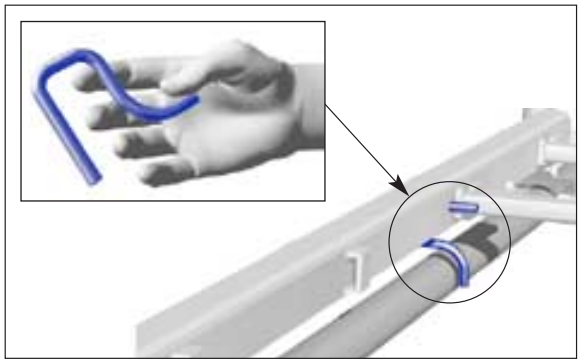


Figure 21

Before proceeding, for additional security, each Purlin Frame must be secured by inserting Locking Pin through appropriate hole in Fixing Beam.

Note - The Locking Pin secures the Purlin Frames each side of truss.

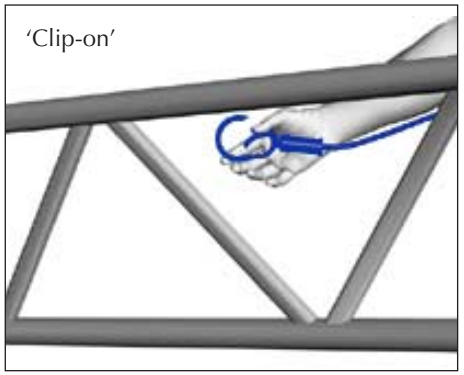


Figure 22

Before proceeding further, it is essential that a safety harness be worn with a double lanyard clipped off the top chord of the Aluminium Beam.

Lanyards must NEVER be attached to Purlin Frames or Fixing Beams as they might not be fixed completely during erection and dismantling!

Figure 23

As with fixing beams, it is advisable to pre-determine the positions for Gable Guard Rail Adaptors at the appropriate spacing starting at eaves.

GABLE EDGE PROTECTION IS FITTED PROGRESSIVELY WHILST FRAMING OUT THE FIRST BAY.

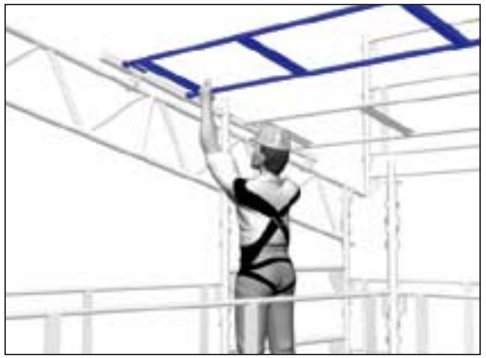


Figure 24

If possible, working from the safe area of the side scaffolding, fit second Purlin Frame and tighten upper fitting on Fixing Beam.

If not possible, straddle beam as in figure 26.

Figure 25

Guard Rail Post is then fitted.