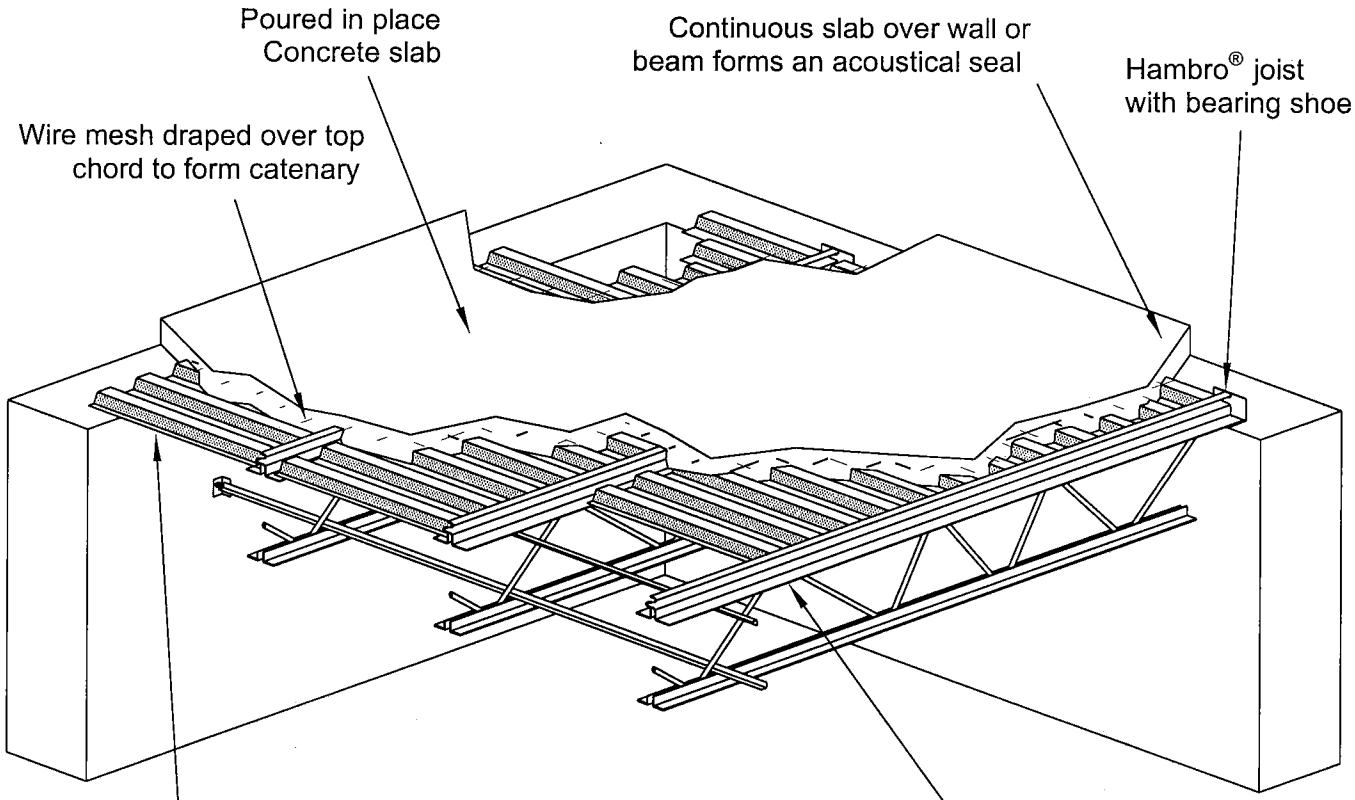
Installation Guide — Hambro® MD2000

This manual is provided as a basic guide of recommended techniques for the installation of the Hambro ® Composite Floor System. This information is not intended to take the place of the requirements of any local building codes, local code requirements must always govern and be followed. Every actual installation must be made in accordance with the contract drawings, specifications, and approved installation drawings provided by your Hambro® supplier. Accordingly, while these guidelines are intended as recommended general techniques to be followed, these techniques can be used only to the extent they do not conflict with applicable building code requirements and approved drawings and specifications. You are requested to contact your Hambro® supplier for contradictions or conditions not clearly covered in this manual.

The answer to an economical installation: SIMPLICITY



CANADA PATENT NO.
2146294

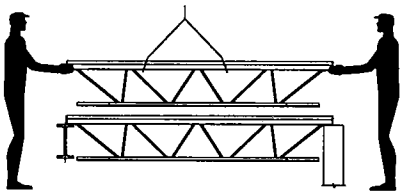
U.S. PATENT NO.:
5544464

OTHER U.S. & FOREIGN PATENTS PENDING

Installation Guide — Hambro® MD2000

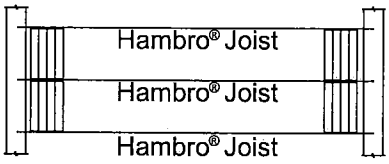
THE ANSWER TO AN ECONOMICAL INSTALLATION

(1) SPREADING THE JOISTS



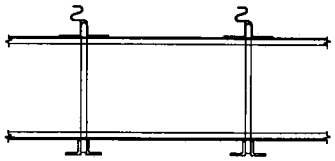
Joists are placed on the walls or beams in accordance with the spacing indicated on the Hambro® drawings stamped for "Field Use".

(2) SPACING VERIFICATION



At each end of Hambro® Joist, place one sheet of deck to ensure proper spacing.
Do Not weld any joist in place without first ensuring the proper spacing.
Do Not fasten the deck down until any required metal bridging is completely installed (see step 3).

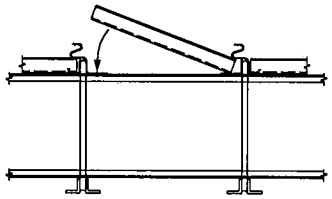
(3) TOP & BOTTOM CHORD BRIDGING (as required)



L1⅛x1⅛x0.09 bridging is field welded or screwed to the top chord and bottom chord in accordance with the Hambro® drawings stamped for "Field Use", for bracing during the concreting stage.

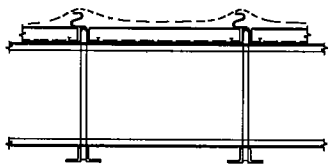
No shoring is required unless noted.

(4) INSTALLING THE DECK



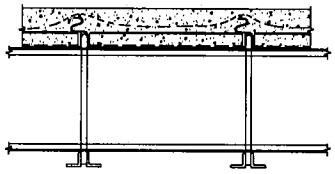
The metal deck is installed by sliding the deck under the top chord of one Hambro® joist, and resting it on the top chord angle of another Hambro® joist. The deck is fastened to the top chord with self tapping screws or field welded.

(5) MESH IN PLACE



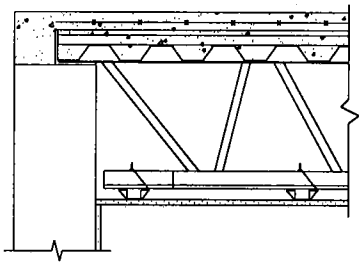
Standard 8' x 20' flat sheets of mesh are easily placed over the top chords of the Hambro® joists. With the top chord acting as a highchair, the mesh forms a natural catenary to reinforce and support the concrete slab. No additional mesh support is required between the joists unless noted.

(6) POURING CONCRETE



Minimum design practice calls for a 2 ¾" 3000 psi slab above a 1 ½" deck. The monolithic pour of the concrete slab will enhance the diaphragm action and the acoustical seal where the slab passes over the wall, once the concrete is cured. The patented top chord protrudes into the slab for composite action, and serves as a guide for concrete placement.

(7) UL® FIRE RATED (IF REQUIRED)



Furring channels are tied with wire to the bottom chord of the Hambro® joists. Fire rated gypsum or acoustical board completes the assembly, providing an attractive continuous ceiling.

NOTE:
All Hambro joists should be stable and plumb, with all required bridging installed, prior to walking on joists to place deck.

NOTE:
All joist shall be erected in such a manner so that they are vertical, level and plumb, and at proper elevations. Any shimming that may be required shall be be done with metal.

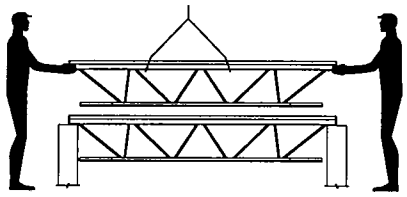
INTRODUCTION

TRAINING FOR INSTALLERS

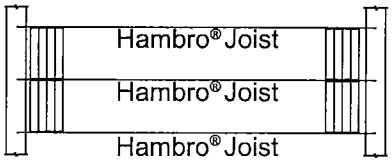
Take two Hambro® joists and set them on supports spaced 4'-0" apart. Then take a 3'-10½" wide sheet of deck and place it between the Hambro® joists at each end for spacing, resting the flute ends on the top chord angles.

The Hambro® installation breaks down into seven simple steps:

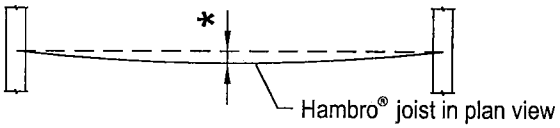
1. Install the joists.



2. Spacing Verification.

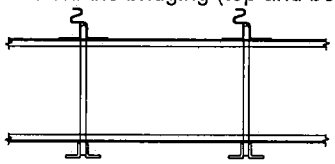


3. Check for sweep



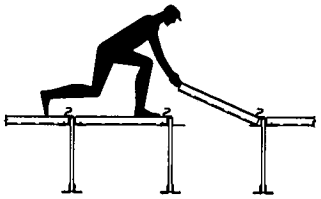
* Verify the sweep in the top chord is less than, or equal to 1" per 20' joist length.

4. Place and weld the bridging (top and bottom chords).

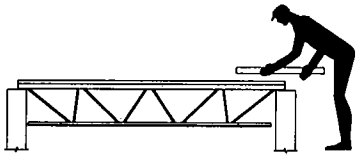


(see Hambro drawings stamped "Field Use" for locations of bridging - if required)

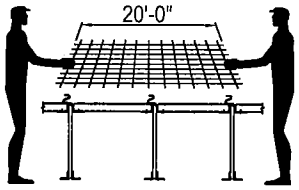
5. Place the metal deck



6. Check proper bearing of joist shoes (fasten as required).



7. Place the mesh.



These steps create a simple flow of production that complements any construction schedule.

NOTE: After installation, permissible Hambro® joist sweep shall be 1" in 20'-0".

TOOLS

Few tools are needed to install Hambro®, but be sure to have enough of the proper equipment available to keep all men working.

Plan on having the following items available:

1. Sledge hammer for tapping and moving joist shoes to proper bearing position.
2. Reciprocating power saw, with metal cutting blade.
3. Welding machine if bridging is to be welded, or equipment to screw down the bridging.

DELIVERY, HANDLING AND STORAGE

DELIVERY

Hambro® joists are delivered on a flat bed trailer, banded in nested bundles and tagged by job. Proper equipment should be provided for off-loading the material.

All material must be checked by the buyer and/or installer upon arrival at the job site, with discrepancies and damages promptly reported to your Hambro® supplier at time of delivery.

NOTE: Hambro® joists shall be fabricated with approximately following cambers*:

* Based upon dead load design

SPAN	CAMBER
10' to 20'	0" to 3/4"
20' to 30'	3/4" to 1-1/2"
30' to 40'	1-1/2" to 2"

HOISTING

When hoisted by crane, the cables must be placed at third points and under the top chord of the joists, never attached to the web members.

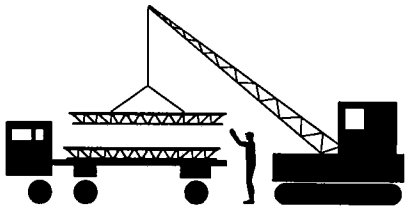


Diagram #1

STORING

The Hambro® joists must be stored upright on a level surface; to prevent damage, joists should not be stacked.

DAMAGED JOISTS

Care should be exercised at all times to avoid damage through careless handling during unloading, storing and installing. Note, that damaged joists may impair the performance and safety of the system, and must be repaired or replaced prior to installation.

DO NOT MAKE FIELD REPAIRS TO DAMAGED HAMBRO® JOISTS WITHOUT WRITTEN APPROVAL FROM YOUR HAMBRO® SUPPLIER AND STRUCTURAL ENGINEER OF RECORD. HAMBRO ®WILL PROVIDE A REPAIR DETAIL AT NO CHARGE TO OUR CUSTOMERS.

METAL DECK DELIVERY

Metal deck will be delivered to the job site in bundles per width. Use caution when handling metal deck, the edges may be jagged or sharp.

JOIST AND DECK IDENTIFICATION

The Hambro® joist is tagged with an identification plate attached at one end, at joist shoe. (Diagram #2)
The metal deck is tagged with paint or marker on the tops of the bundles. (Diagram #3)

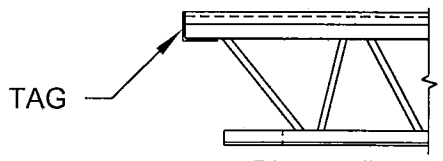


Diagram #2

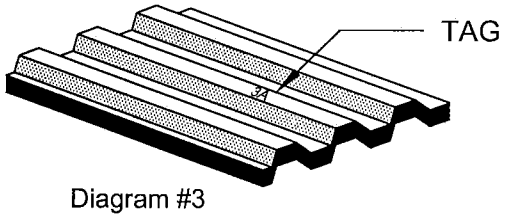


Diagram #3

INSTALLING THE JOISTS

TYPICAL SPACING

Hambro® joists are typically spaced at 4' + o.c., to start the installation procedure, space them approximately 4' + o.c. on the bearing provided. In commercial applications the typical Hambro® spacing may be 5' nominal.

CONDITIONS WHERE EXTRA CARE SHOULD BE TAKEN

A. Special joists will determine the direction of the top chord. Before you start installation, determine proper direction of top chords from joists that have special conditions (i.e. deep shoe (DS), lowered angle (LA), point load reinforcing (℗)). Study the Hambro® installation drawings for special conditions and follow the position of the tagged ends for proper orientation of joists.

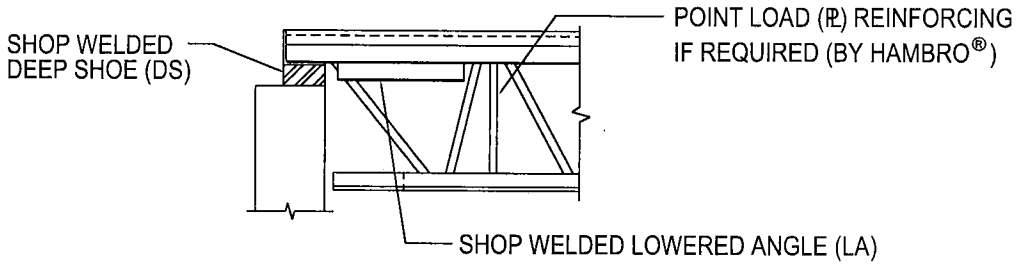


Diagram # 4

B. End joists: A close measurement shall be taken on the first joist that is set, usually the one next to the wall, beam, or tie joist. Careful measurement of this spacing, which is usually a little larger or smaller than the standard 4'-0" spacing, will save unnecessary shifting of the system. All measurements should be taken nominally to the centerline of the joists.

C. Bearing: It is important to make sure that the joist shoes are placed properly on the supporting walls or beams. Joists should be centered so you get equal bearing for the shoes. The minimum bearing on masonry, concrete, metal stud or wood support is 3 ½ inches (see Diagram #5). The minimum bearing on structural steel is 2 ½ inches (see Diagram # 6), unless noted otherwise. REDUCED BEARING COULD PRESENT A SAFETY HAZARD. As soon as the Hambro® joist is installed, the bridging shall be installed (as required) according to the installation drawings before a complete installation of the metal deck. Never weld or screw any bridging without first having inserted decking at each end of every joist in the unit to ensure proper spacing.
Particular attention should be paid to the installation of long Hambro® joists, each joist shall be adequately braced before the next joist is installed.

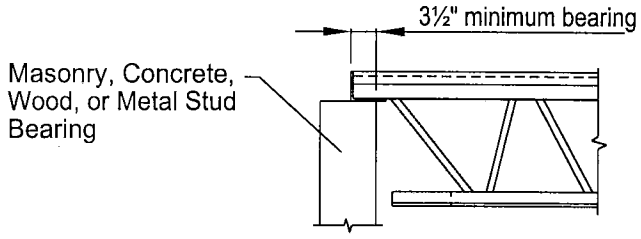


Diagram # 5

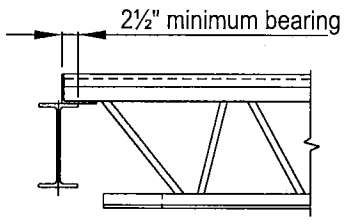


Diagram # 6

INSTALLING THE METAL DECK

Angles on either side of the Hambro® joist top chord provide a seat to support 1½" metal deck. The metal deck is laid down one sheet at a time, overlapping side lap joints and where necessary. Once laid down it is to be secured to the top chord either with #12 self tapping fasteners, or field weld, at the middle of the spacing and on each joist, on each side, with ½" dia. puddle welds. (see diagrams # 7 & 8)

Side Lap Joints: Where deck spans exceed 4'-10" use side lap fasteners at 3'-0" o/c max.

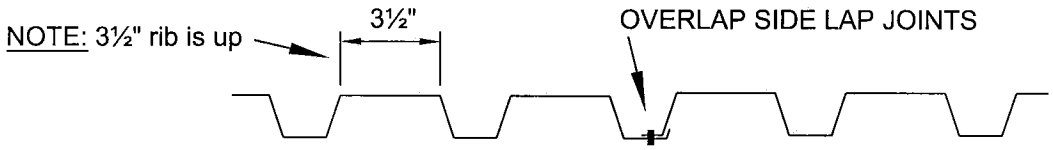


Diagram # 7

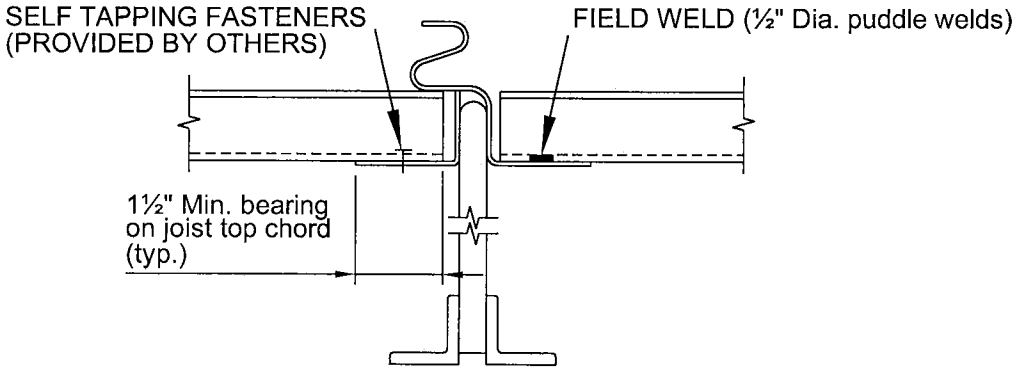


Diagram # 8 (both fastening options shown)

NOTE: Do not leave loose deck at the end of the day, as wind may displace the sheets and cause injury or property damage.

For "L": 6" min. (see Diagram # 9), closure angles or bent plates are to support the slab. The closure angle or bent plate must be properly fastened to the Hambro® joist top chord.

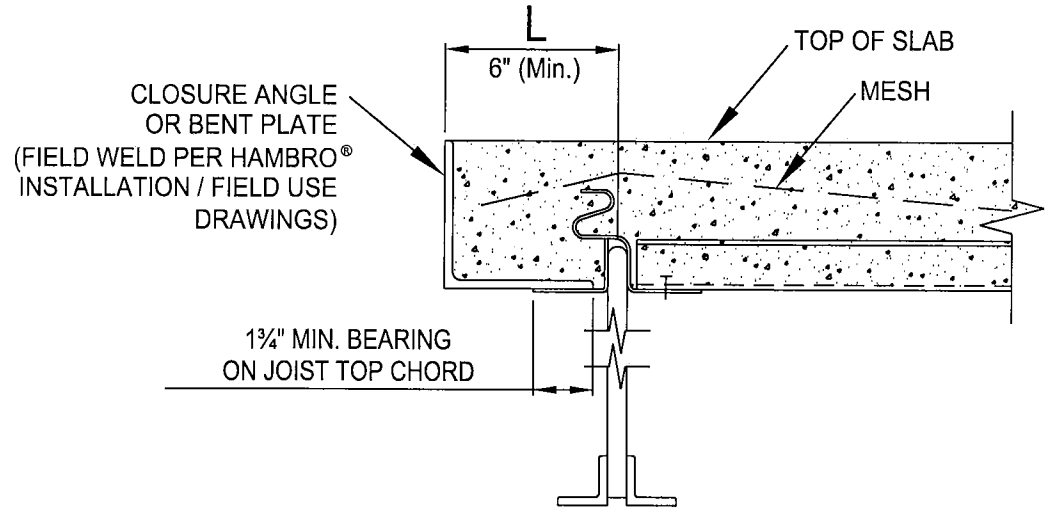


Diagram # 9

THICKENED SLABS

In the areas where thicker concrete slabs are specified, the metal deck should be installed on shop welded lowered angles (LA) on the Hambro® joist in order to support the thickened slab (see Diagram #10).

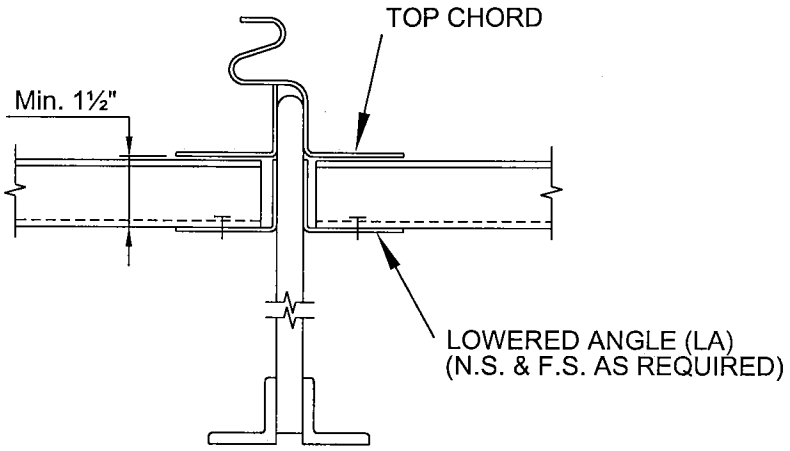


Diagram # 10

INSTALLING THE TOP AND BOTTOM CHORD BRIDGING

To provide additional stability during concreting, the horizontal bridging (as required) shall be welded or screwed to the bottom chord and the top chord as specified on the installation / "Field Use" drawings. All bridging anchors shall be completely installed before construction loads are placed on the joists. Bridging shall support the top chords against lateral movement during the construction period and shall hold the steel joists in the approximate position as shown on the installation / "Field Use" drawings.

For spans up through 40 feet, welded horizontal bridging may be used except where the row of bridging nearest the center is required to be bolted diagonal bridging.

NOTE: BRIDGING MUST BE CONTINUOUS AT TOP AND BOTTOM CHORDS TO ENSURE THAT ALL JOISTS REMAIN VERTICAL. AT THE END JOIST, WHERE NO WALL OR STRUCTURAL FRAME IS PRESENT, BRACE THE BOTTOM CHORD TO THE FLOOR OR GRADE.

PLACING THE MESH

FLAT 8' x 20' SHEETS of plain welded wire mesh are recommended instead of rolled mesh for its ease of handling, and because it lays more naturally without ends sticking up.

LAPPING

Be sure to get the minimum lap in both directions. Also be sure the mesh sits on the perimeter beams or walls at least 4" in order to develop the capacity of the slab, see Diagram #11 - Mesh Lapping.

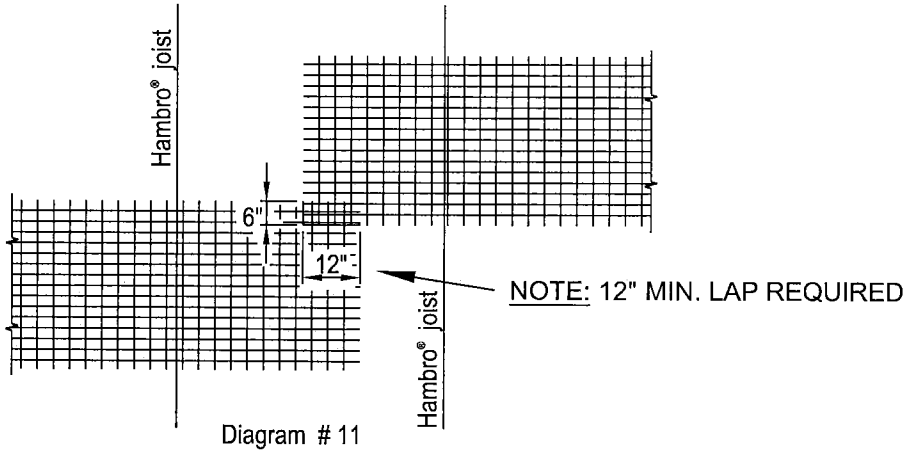


Diagram # 11

Unless otherwise noted on the approved installation / "Field Use" drawings a single layer of mesh is all that is required

Always check approved installation drawings and follow the contract drawings for slab reinforcement.

The flat sheets of mesh should drape naturally to the desired location and as noted in Diagram #12 do not step down the mesh on either side of the top chord.

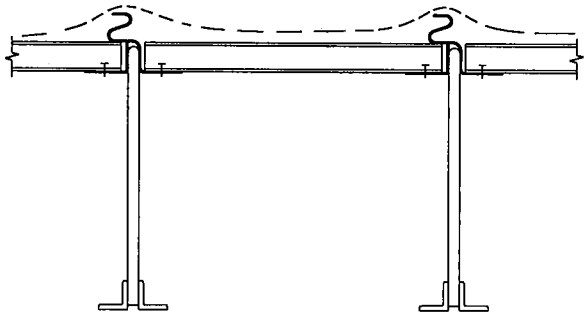


Diagram # 12

PLACING THE CONCRETE

CONCRETE MIX

The minimum compressive concrete strength is 3000 psi for normal weight concrete. The aggregate in the concrete mix should not be greater than ¾".

PLACING

When placing the concrete, maintain a depth of 1¼" minimum above the top chord for a 2 ¾" minimum slab above deck. You will notice the joists are fabricated with a positive camber to offset the deflection caused by the weight of the concrete. It will come out as the slab is poured, leaving a small residual camber for additional dead load.

NOTE: Hambro® joists shall be fabricated with approximately following cambers*:

* Based upon dead load design

SPAN	CAMBER
10' to 20'	0" to 3/4"
20' to 30'	3/4" to 1-1/2"
30' to 40'	1-1/2" to 2"

SLUMP

Field experience indicates a 4" to 5" slump at the time of the pour is easy to work with and finish. Greater slumps will create excessive leakage and cleanup. CAUTION: TOO HIGH A SLUMP REDUCES THE STRENGTH OF THE CONCRETE AND CAUSES EXCESSIVE SHRINKAGE CRACKS.

CURING

Curing procedures shall be in accordance with the latest ACI requirements.

VIBRATING

The concrete shall be lightly but thoroughly vibrated to ensure:

1. The full encasement of the top chord in the concrete (letting the vibrator lightly hit the top chord will assure encasement). This is important in order to obtain the full design capacity of the system.
2. The elimination of "honeycombs".
3. That proper concrete cover is provided under the mesh.

CONSTRUCTION JOINTS

When pouring and finishing a deck, it is not necessary to complete the entire deck monolithically. If it becomes necessary to stop the pour parallel to the joists, the joint should be midway between the joists, but never closer than 6" to the top chord.

SAFETY PRECAUTIONS

SAFETY PRECAUTIONS WHEN POURING CONCRETE

The following 3 steps should be followed before and during the concrete pour to ensure a safe operation:

1. Check that all the metal deck and joists remain in the proper position prior to, and during the pour.
2. During the pour, care should be taken not to subject the joists to excessive construction loads. Otherwise, the performance and safety of the system may be impaired. Do not pour concrete in excess of slab thickness specified on drawings, and do not drop large bucket loads in a concentrated area.
3. The metal deck can not support buggies; therefore, runways must be placed on the top chord. This is usually accomplished with wood planks 2" x 12", placed perpendicular to the top chord (see Diagram # 13).

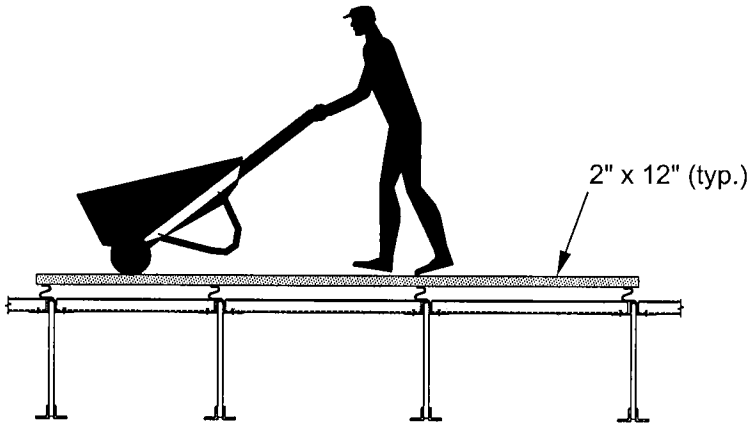


Diagram # 13

When the concrete attains a cylinder strength of 1,000 psi, the concrete deck is ready for work. Care should be exercised not to overload the system.

IMPORTANT NOTICES

A. Do not modify or alter any Hambro® product without first obtaining written approval for the desired change from the structural engineer of record and guidance from a qualified Hambro®Representative.

B. Similarly, if it becomes necessary to vary from the "APPROVED" installation drawings supplied with each job, obtain approval from the structural engineer of record prior to making the change.

C. CAUTION...DO NOT OVERLOAD (i.e. skids of blocks, drywall, sand, etc.) slab or joist at any phase of construction.

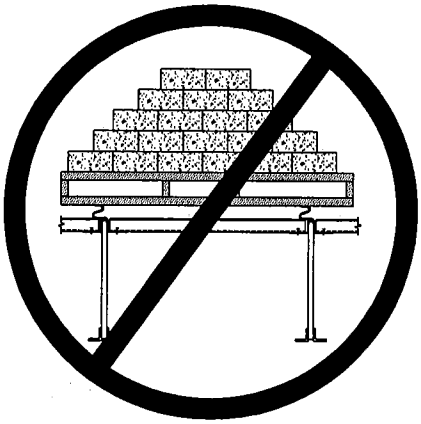


Diagram # 13