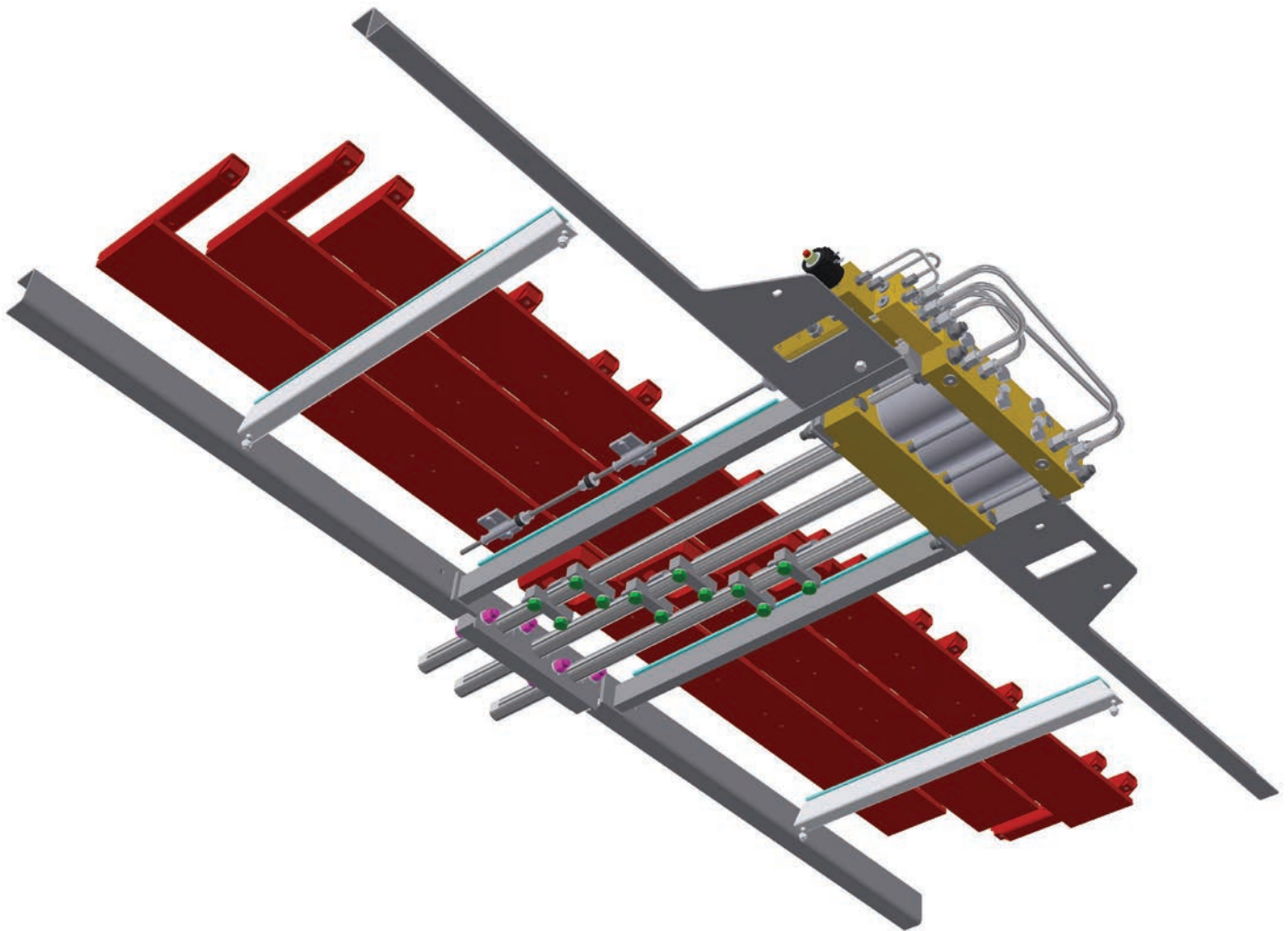


KMD 250 / KMD 300

KEITH Manufacturing Co.
www.KeithWalkingFloor.com
World Headquarters
Toll-Free: 800-547-6161
Phone: +1-541-475-3802



INSTALLATION MANUAL

Original Instructions

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Contact Information - KEITH Manufacturing Co.

World Headquarters - USA

401 NW Adler St.
Madras, OR 97741
Toll-Free: 800-547-6161
Phone: +1-541-475-3802
Email: Sales@KeithWalkingFloor.com

Canada

Brantford, ON
Phone: +1-519-756-9178
Email: CanadaSales@KeithWalkingFloor.com

México

Guadalajara, Jal.
Phone: +52-333-616-5079
Email: KMC_Mexico@KeithWalkingFloor.com

Australia

Somerville, VIC
Phone: +61-0404-041-883
Email: AUSales@KeithWalkingFloor.com

Europe Headquarters

Barneveld, The Netherlands
Phone: +31-342-422007
Email: EuroSales@KeithWalkingFloor.com

Not all parts or services available in all regions. Some components only available assembled or in kits. Contact your regional office for information on available parts and services.

Service Information

- Use hydraulic oil or Vaseline to lubricate seals. Do NOT use grease.
- Do NOT use Teflon tape on any hydraulic components.
- When welding on drive frame, ground specifically to what you are welding on, otherwise it can short across component assemblies damaging seals and gaskets.
- KEITH sells flow meters, pressure testers for troubleshooting and several tools to aid in rebuilding components and drives.

KEITH Mfg. fabricates many standard drive systems, included in this parts catalog, and also fabricates custom drive systems, too numerous to include, therefore KEITH requires the following information from your drive system to ensure we provide you with most accurate information. Please have the following information readily available before contacting KEITH for support:

- Model Number (Located on the Serial Plate of the drive unit)
- Serial Number (Located on the Serial Plate on the drive unit)
- Quantity & length of floor slats
- Vehicle make and unit installer

1.0 Introduction

The following manual is a guide for installing a new KEITH® KMD 250 or KMD 300 unloading system, coinciding with the original construction of a trailer in which it is being placed. This unloading system can be used for a variety of applications. Therefore, many variables affect the installation; however, the general process always remains the same. Details of the installation vary according to vehicle or trailer features, kit selections, and installer preferences. Optional sets of instructions are given for some operations, to allow for flexibility. Instructions provided by the manufacturer may not include all possibilities.

This manual focuses on installation of KMD drive unit with a 5" [127 mm] stroke and both 3.65" and [97 mm] flooring.

Installation time varies, but will usually take between 35 hours and 100 hours, depending upon the experience of the installer and the adaptability of the vehicle. Some preparations (Section 2) will save time and effort. One person with good fabrication and welding skills can complete the entire installation.

The first step in any installation is to compare the work order with the *WALKING FLOOR* materials that were delivered to you.

Next, make certain that all the required materials and tools are available. A list of tools and materials is found in Appendix 2.

Several reference drawings accompany this manual. The KEITH KMD drive owner's manual contains more detailed information about the system, as well as information regarding start up and operation procedures.

Direct any questions you may have to KEITH Mfg. Co. or one of our international offices listed on the cover of this manual.

Note: Specifications are subject to change without notice.

1.1 Basic KMD Drive Unit Components

KMD Drive Unit: (See Figure 1)

Cylinder Pack: The drive cylinders move the floor slats. Each KMD drive has three hydraulic cylinders. The KMD 250 uses cylinders of 2 1/2" [64 mm] ID. The KMD 300 uses cylinders of 3" [76 mm] ID.

Switching Valve: The switching valve determines the direction of oil flow to cylinders, as well as movement in the load or unload direction.

Cross-Drive: Three cross-drives are connected to the cylinder rods, allowing each cylinder to drive multiple floor slats.

Drive Shoe: The floor slats are connected to the cross-drives through the drive shoes.

Control Rod: The control rod allows the stroke to be adjusted in order for the drive unit to run efficiently.

Bearing Block: Bearing for the cylinder rods.

Components that are not part of the drive unit:

Slat/plank: Slats/planks are the moving portions of the floor (not shown).

Sub-Deck: The sub-deck is the square tubing mounted on top of the cross-members. The slats/planks ride on top of slide bearings mounted to the sub-deck (not shown).

KMD BASIC PARTS IDENTIFICATION

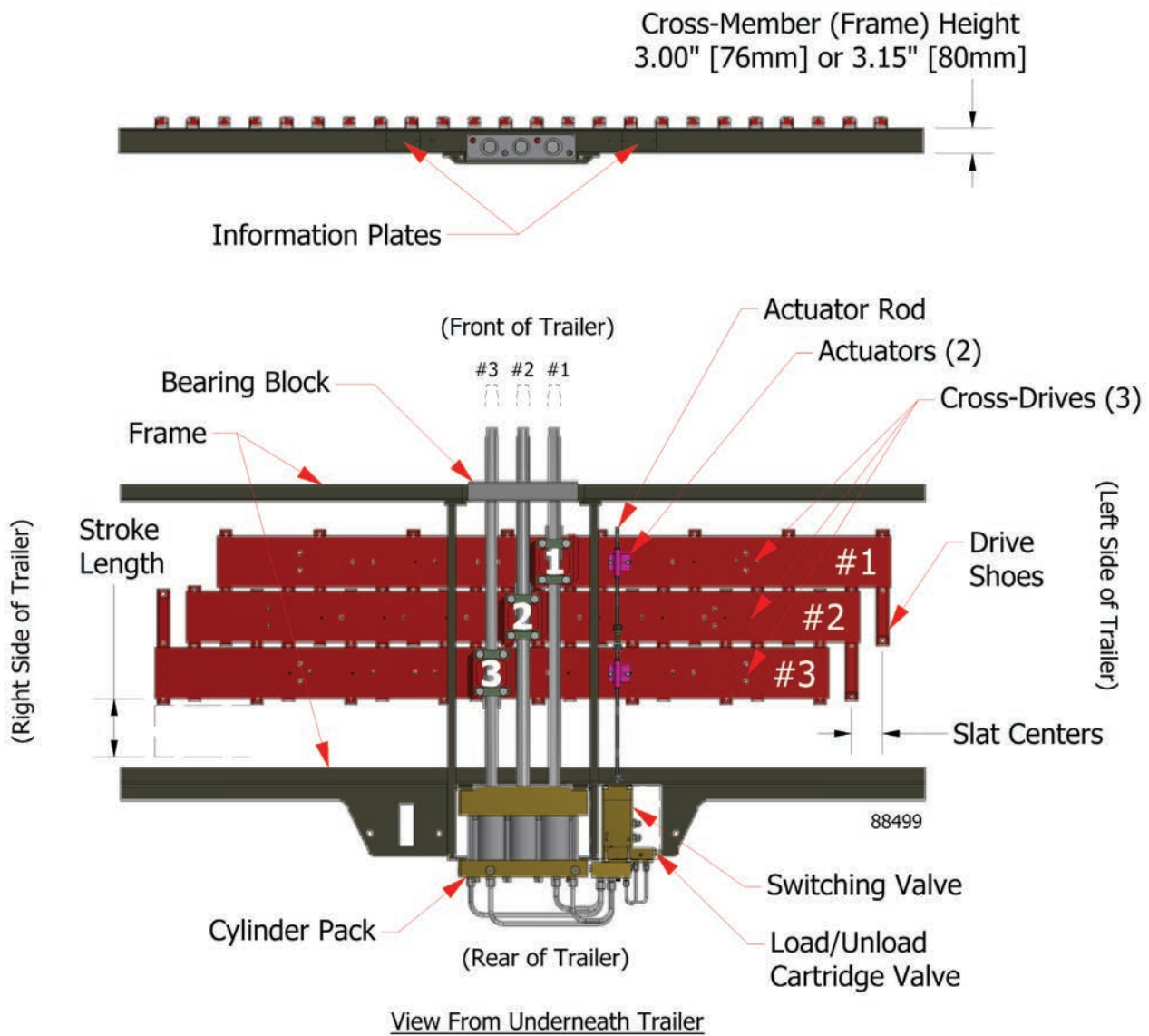


Figure 1

2.0 Preparations for Installation

The following considerations need to be made before installation of the drive unit.

Installation of a KMD drive unit is easiest if it coincides with construction of the truck or trailer. Although the order of construction may vary, it is highly recommended that the drive unit is installed while there are no walls on the truck or trailer. An overhead crane or equivalent is required for lifting the drive unit into place.

Begin by reading through this manual and familiarizing yourself with each step and procedure of the installation process. Compare the drawings and instructions with your trailer to make sure that they match. Attempt to plan ahead by visualizing what the end product will look like.

In addition to supplying the trailer itself, the customer is responsible for designing and supplying baffle plates. The front slope shield can be supplied by the customer or purchased from KEITH Mfg. Co. (See drawings and related sections for more details).

Keep in mind where the trailer's air (pneumatic) and electrical lines will be located. Make sure that they will not be damaged by or interfere with moving parts. If in doubt, please consult with KEITH® Mfg. Co. on the proposed location before cutting holes for mounting to ensure that they will not interfere with operation.

The vehicle or trailer may require preparation before the system is installed, especially for a retro-fit. Planning ahead for the *WALKING FLOOR* installation requirements may save a significant amount of time, especially when building a new vehicle or trailer.

2.1 Drive Unit Compatibility

KMD drive units come with cross-member heights of either 3" or 80 mm. If the cross-members are a different height, the drive unit will have to be shimmed.

2.2 Plumbing

The drive unit is hydraulically operated and must therefore be connected to either a PTO (Power Take Off) wet kit or a self-contained power unit. For optimal performance, it is recommended that a pressure compensated variable displacement pump is used with this system. Consult the plumbing diagrams located in the appendix. Decide what components are applicable to your system. Consider what combination of fittings, hydraulic tubing and or hose will be needed in order to plumb your system. Lay out all necessary fittings. Note that it is easier to attach hydraulic hoses to the pressure (pump) and return (tank) ports of the KMD switching valve before the sub-deck is installed over the drive unit. Use fittings that are long enough to connect to a mounted ball valve. Consider where the hydraulic tubing will be located. Keep the number of bends to a minimum and always use sweeping elbows to reduce heat build up. A central location at the front of the trailer is preferable for the quickcouplers in order to minimize hose lengths. Section 3.8 provides more information on this subject.

Four possible plumbing options:

- 1) Routing the hydraulic tubing through the cross-members (Figure 2). Make two holes per cross-member large enough to fit a protective grommet around the tubing size of your choice. The holes should be close to the sides of the trailer to maintain the structural integrity of the cross-members. Access holes must be cut or drilled through the nose of the trailer, in line with where the tubes will pass through cross-members. Seal the holes after the tubing is in place.

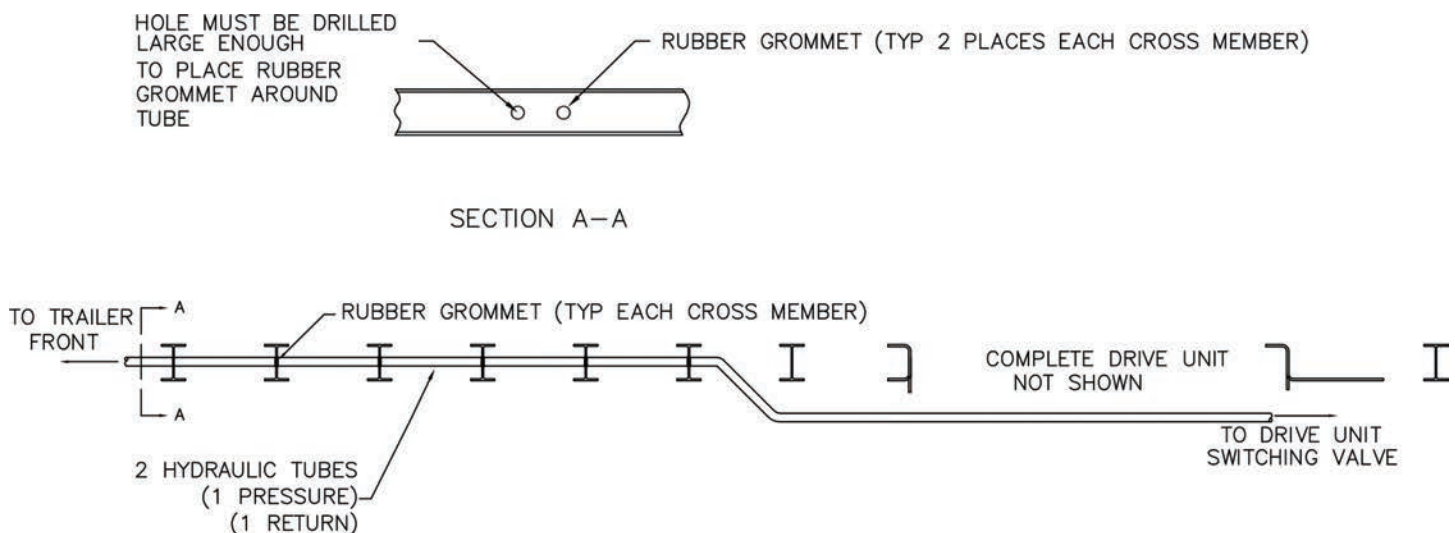


Figure 2

NOTE: It is easier to drill holes for the hydraulic tubing through cross-members before they are mounted on a new trailer.

- 2) Routing the tubes under the side seal (Figure 3). Check the available space underneath the side seal. Both tubes may be on one side or one tube may occupy each side of the trailer. Tubes are clamped to cross-members or placed inside PVC pipe to prevent rubbing. The side seal should be detachable for maintenance.

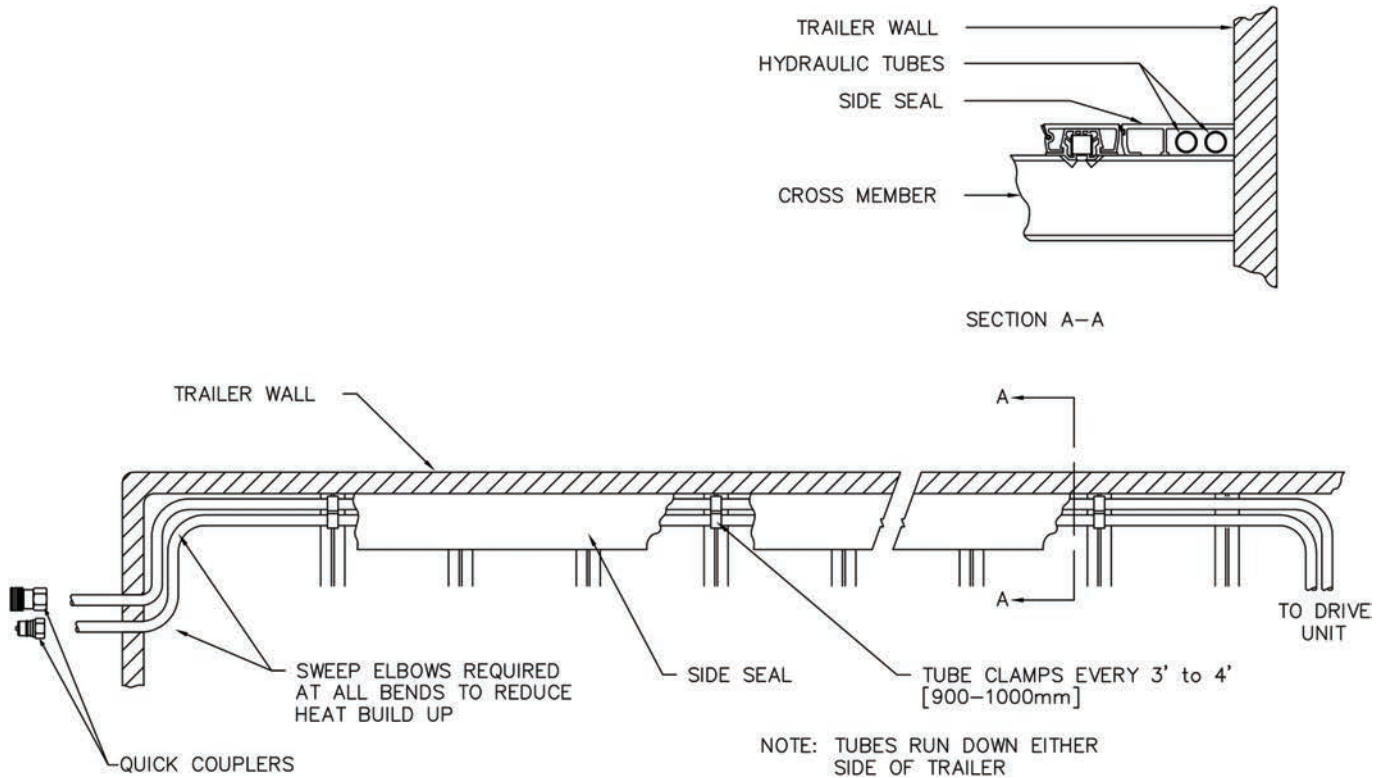


Figure 3

- 3) Routing the tubing along the main chassis frame rail.
- 4) Routing the tubing directly underneath the cross-members. This option is not recommended, as it leaves the tubing vulnerable to damage or may cause problems with tire clearance.

2.3 Trailer Wires & Lines

Make sure that electrical wires and lines cannot be damaged by moving parts. If necessary, reroute them to protect them from damage. Check for proper light and brake performance.

2.4 CAUTION!!!

DO NOT CONNECT THE DRIVE TO A HYDRAULIC POWER UNIT AND CYCLE BEFORE COMPLETING INSTALLATION!

3.0 Installation

3.1 Cross-member Installation

3.1.1 Cross-members

Cross-members function as support for the sub-deck as well as keeping the slide bearings in their proper position.

- 1) Compare the trailer cross-member height to the formed cross-members on the drive unit. They should be the same. The drive frame for the KMD drive unit is formed to be installed with either 3" or 80 mm cross-members. If higher cross-members are used, the drive unit will have to be shimmed to match the height of the plane across the top of the cross-members. If they differ, contact KEITH Mfg. Co. or one of our international offices for further installation instructions.
- 2) Check the cross-member flange width for proper bearing fit (Figure 4).

The bearings are designed to fit over cross-member flanges that are 2-7/16" [62 mm] or smaller. If the surface is wider than 2-7/16" [62 mm], standard bearings cannot be used. Special bearings can be ordered and will fit up to a maximum flange width of 4" [100 mm].

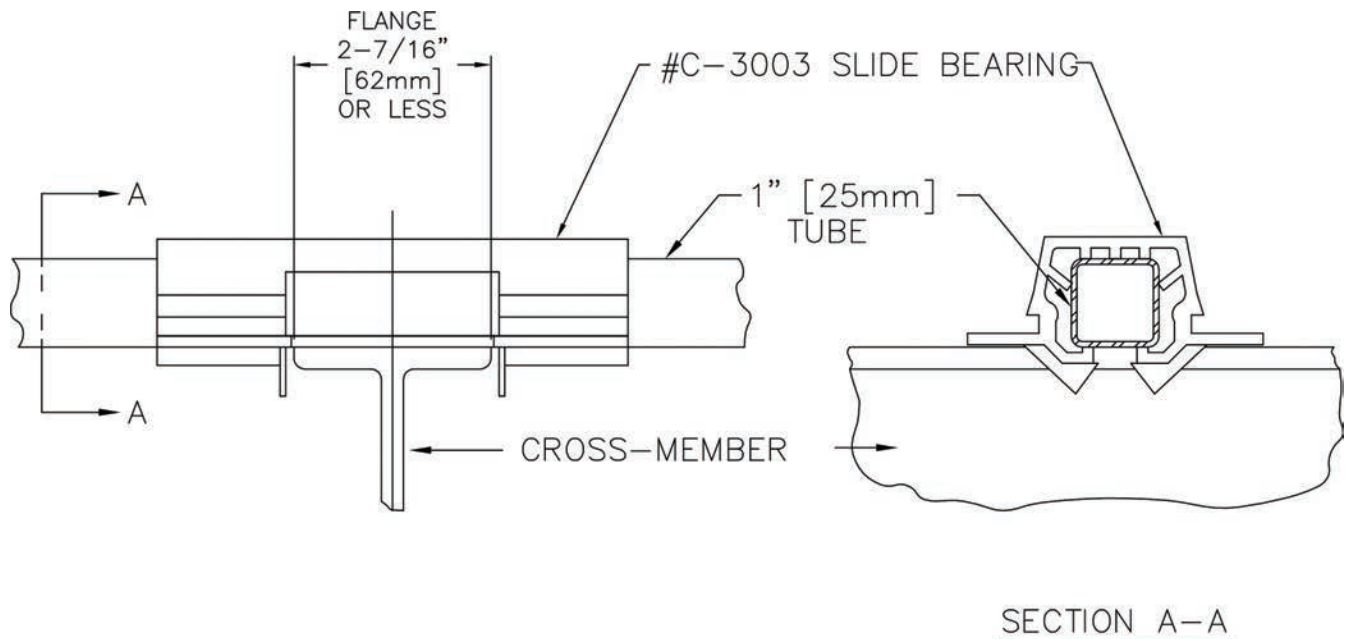


Figure 4

- 3) Choose the location at which the drive unit will be installed and leave an adequate gap in the cross-members (Figure 5). The drive unit is normally installed as close to the rear of the trailer as is practical. Ideally, there should be one cross-member between the baffle plate and drive unit, with enough space for a slide bearing and a hold down bearing. (See below for more information about baffle plate installation). Note that in applications where a trailer is being used on uneven surfaces, it may be preferable to install the drive as far forward as possible in order to reduce the risk of the drive unit contacting the ground (e.g. agricultural trailers).

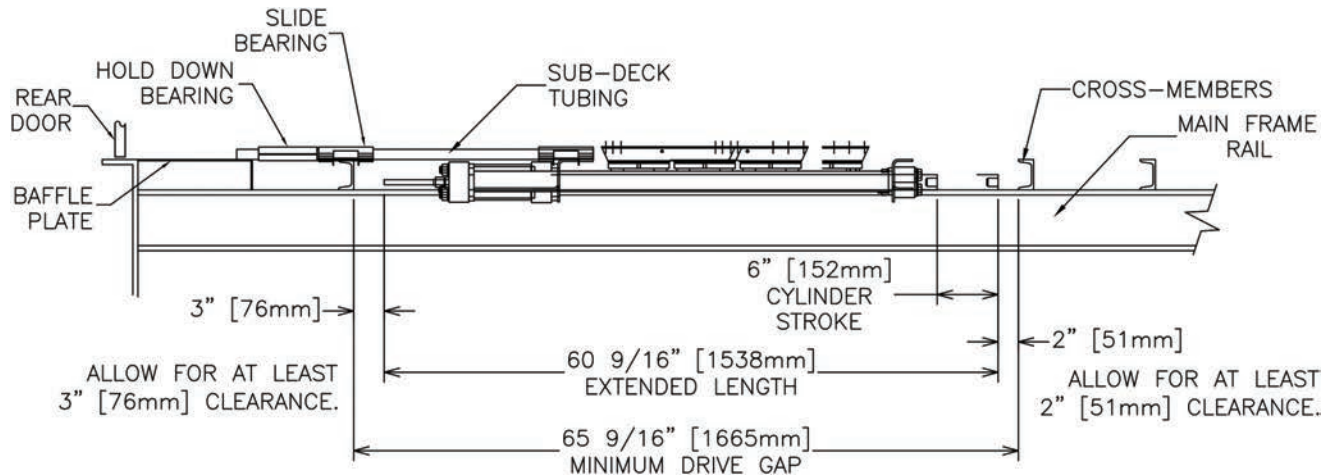


Figure 5

- 4) Lay out and install the cross-members. The style of the baffle plate determines spacing of the cross-member nearest to the rear door. Normally it should be mounted no closer than 12-1/2" [318 mm] inside the doors. See Section 3.2 for more on baffle plate installation. When using a typical slope shield at the front end of the trailer, the last cross-member should be a minimum of 11" [280 mm] away from the front wall. (Figure 6)

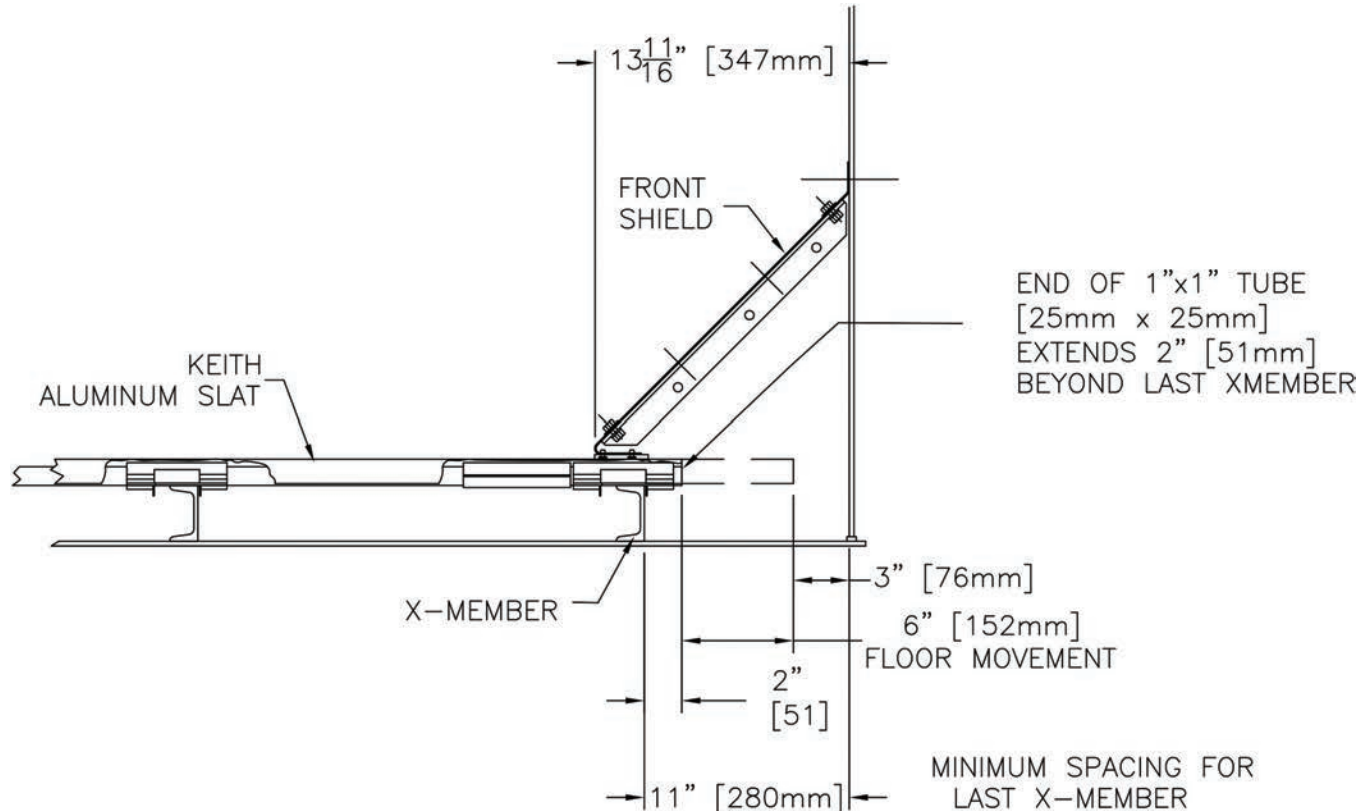


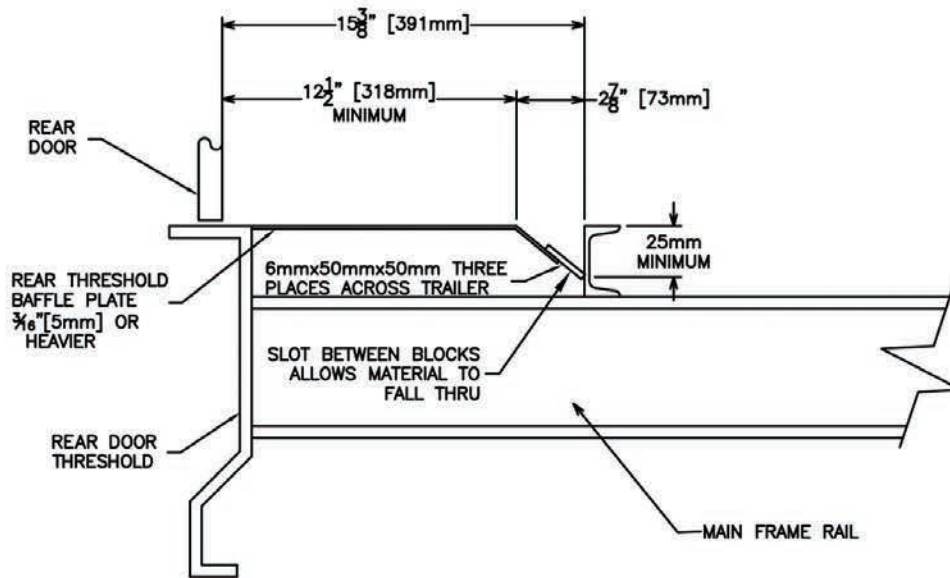
Figure 6

3.2 Baffle Plate Installation

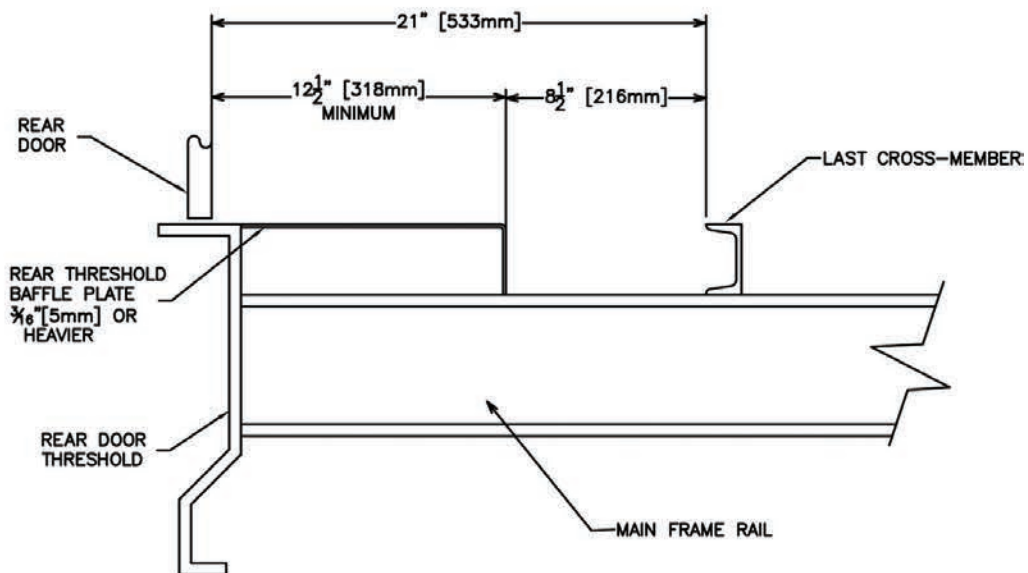
The section of the trailer between the last crossmember and the rear of the trailer needs to have a baffle plate installed. This plate prevents material from falling through the floor when slats are in the forward position and reduces the possibility of a pinch point. It can either be steel or aluminum, corresponding with trailer construction.

- 1) Determine the dimensions of the baffle plate (Figure 7). The baffle plate needs to be a single sheet that extends across the entire width of the trailer. (See Figure 8). The top of the baffle plate must be level with the top of the crossmembers and is welded to the inside of the trailer threshold. The thickness of the plate depends on the type of load. For lightweight materials (e.g. saw dust), use 3/16" [5 mm] mild steel plate. Thicker plate is recommended for heavy, abrasive materials (e.g. solid waste). For fine materials, the baffle plate can be bent down at an angle connecting to the nearest cross-member to prevent material from sifting through. An open slot is allowed to let small amounts of fine material drop through so that material will not build up underneath the slats. This prevents buildup from lifting the slats. For applications with coarse materials, the baffle plate may be bent straight down.
- 2) Cut and form the baffle plate to the proper dimensions.
- 3) Install the baffle plate. Weld the plate into position. Then grind all welds flat on the top surfaces. Make sure that it is level with the top of the cross-members.

FINE MATERIALS

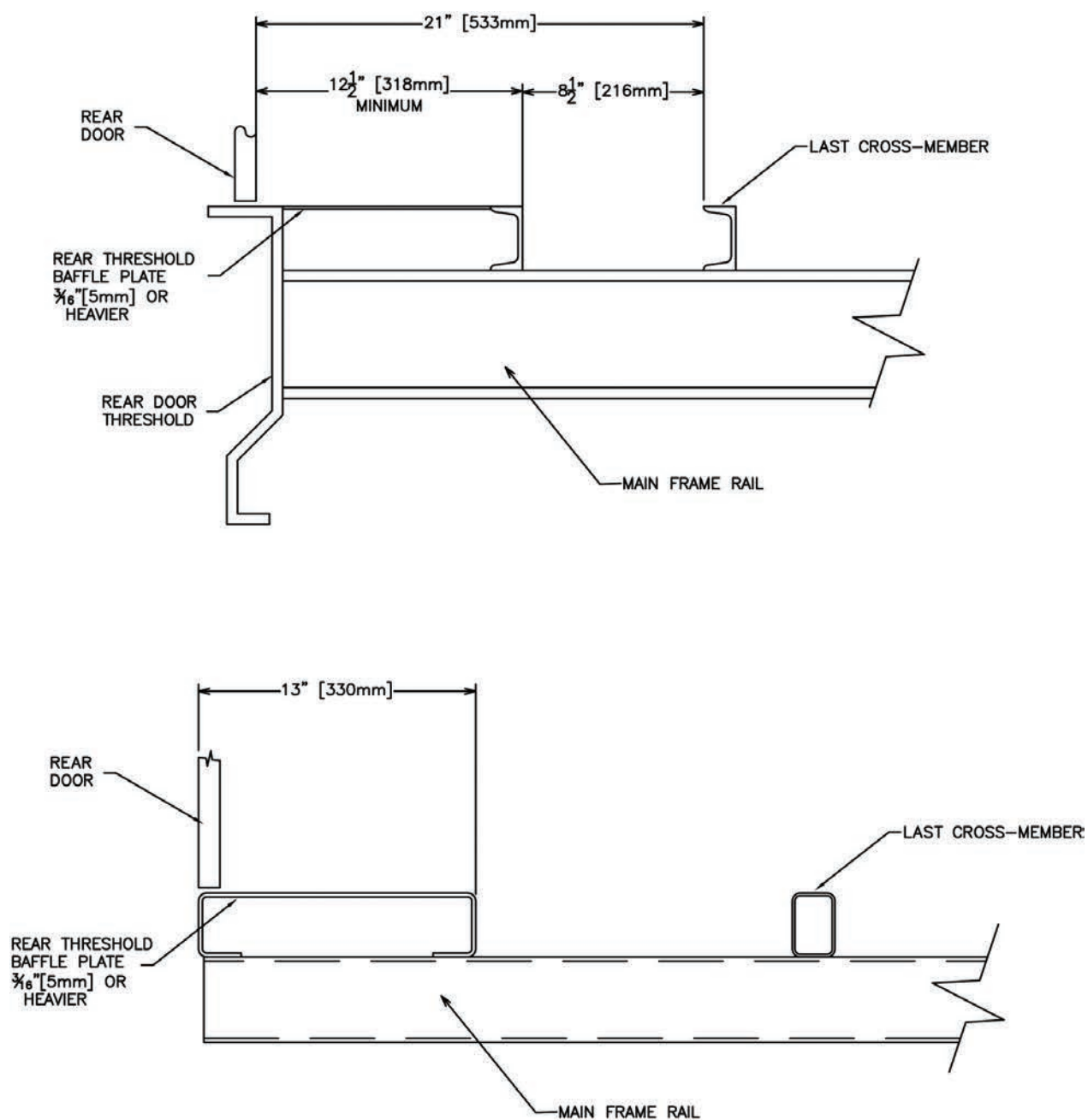


COARSE MATERIALS



REAR BAFFLE PLATE

Figure 7



REAR BAFFLE PLATE

Figure 8

3.3 Sub-Deck Installation

The sub-deck is the structure mounted directly on top of the cross-members and underneath the floor slats. It is assumed, at this point, that the cross-members have been laid out and installed correctly, leaving the proper drive gap for installation of the drive unit. The sub-deck consists of square steel tubing or U-shaped aluminum profiles.

3.3.1 Square Tubing

Proper installation of the 1" [25 mm] square tubing is critical for maintaining drive alignment, floor straightness and for optimal performance of the seal, which is located between the floor slats.

- 1) Choose the sub-deck style that will extend over the baffle plate at the rear threshold and that is most suitable for your application. See section 3.3 for more information.
- 2) Determine the proper length for the 1" [25 mm] square tubes. Lay out the tubes, noting that they must extend 1-1/2" [38 mm] inside the drive cross-members and beyond all other cross-members by 2" [50 mm]. The number of tube sets installed will equal the number of floor slats. (Figure 9)

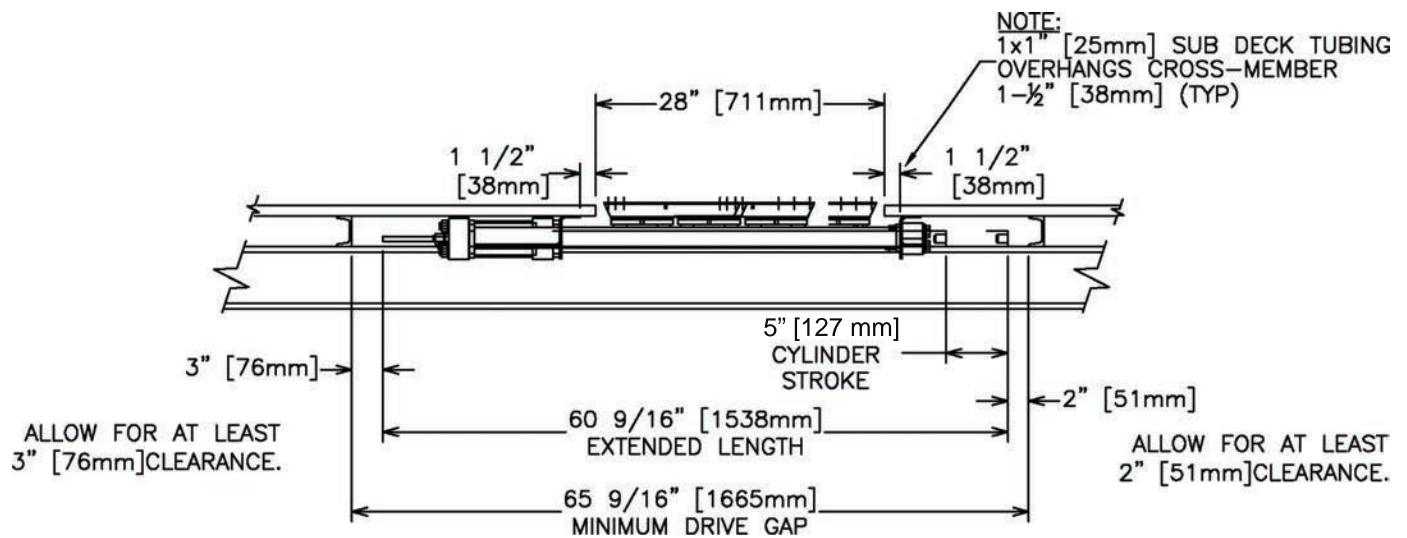


Figure 9

- 3) Position and mount a master tube

One method of installing the sub-deck is as follows. Install a master 1" [25 mm] square tube. Begin by marking the centerline of the vehicle at the front and rear of the trailer. Once the centerline has been found, install a string line along the theoretical edge of the square tube closest to the center.

For drive units with 3.5" slats/planks:

The 1" [25 mm] square tube will be centered with each edge 1/2" [12.5 mm] from the centerline in units with an odd number of slats (e.g. 15 or 21).

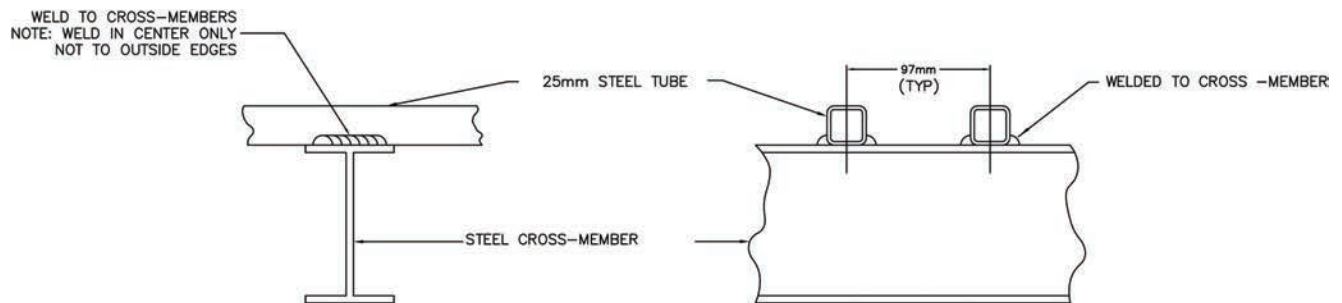
Alternatively, the inner edge of the 1x1 will be 1-5/16" [33.3 mm] from the centerline in units with an even number of slats (e.g. 18 or 24)

For drive units with 97 mm slats/planks:

The edge of the 25 mm square tubing will be 12.5 mm from the centerline in drives with an odd number of slats. (i.e. 15 or 21).

Alternatively, the inner edge of the 25 mm square tubing will be 36 mm from the centerline in drives with an even number of slats (i.e. 18 or 24).

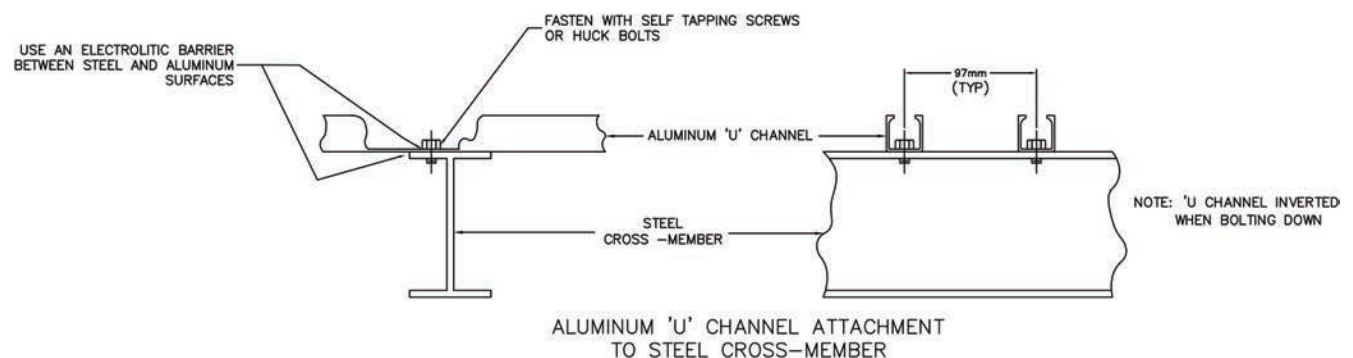
Once the string line has been put in place, install the master 25 mm square tube along the string line, being very diligent to keep it straight and true. Attach the tube using one of the methods detailed below. (Figure 10)



25mm STEEL TUBE ATTACHMENT TO STEEL CROSS MEMBERS

Figure 10

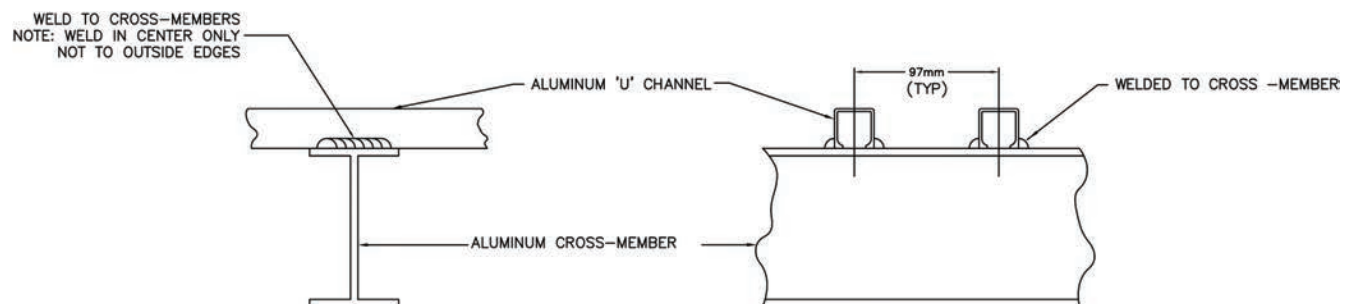
Welds should be a 1/4" [6 mm] fillet centered on the flange, 1" to 1-1/2" [20 mm to 30 mm] long.



ALUMINUM 'U' CHANNEL ATTACHMENT TO STEEL CROSS-MEMBER

Figure 11

If the aluminum extrusions are bolted onto the cross-members, turn the U profile up. (Figure 11) An electrolytic barrier such as packing tape or an appropriate paint should be placed between aluminum extrusions and steel cross-members to prevent corrosion. If the aluminum channel (extrusions) are welded onto the cross-members, put the two legs of the U profile down (Figure 12).



ALUMINUM 'U' CHANNEL ATTACHMENT TO ALUMINUM CROSS MEMBERS

Figure 12

3.3.2 Place drive unit into position

Once the master square tube has been installed, place the drive as near as possible to its final position. The cylinder pack should be at the unload end of the vehicle. Note that there are centerlines scribed across the center on both of the cylinder manifolds. These can be lined up with the centerline of the trailer. (DO NOT WELD IN PLACE). It is easier to attach hydraulic hoses to the pressure (pump) and return (tank) ports on the KMD switching valve before the sub-deck is installed. Make sure that they are long enough to connect to a mounted ball valve.

3.3.3 Install the Two Wear Bars

It is easier to drill the holes required to mount the wear bars before the entire sub-deck is placed in trailer. Slide the support tubes into position between cross-drives and trailer frame rails. Center the wear bars between the drive frame cross-members. Bolt the tubes in place with one 5/16" [9 mm] bolt at each end—one wear bar between the top of each main frame rail and the bottom of the cross-drives (Note that the bolts may not be provided. If bolts are provided, they will be attached to the wear bars with washers, which are required as shims. These shims will need to be placed between the wear bar and chassis member). Install cross-drive support tubes as shown in reference drawing D-52102. Note that the wear bars may need to be shimmed after the drive is permanently installed to create a close fit between the drive and wear pad. Do not shim too much, as an extremely tight fit could cause the UHMW wear pad to shear off. (Figure 13)

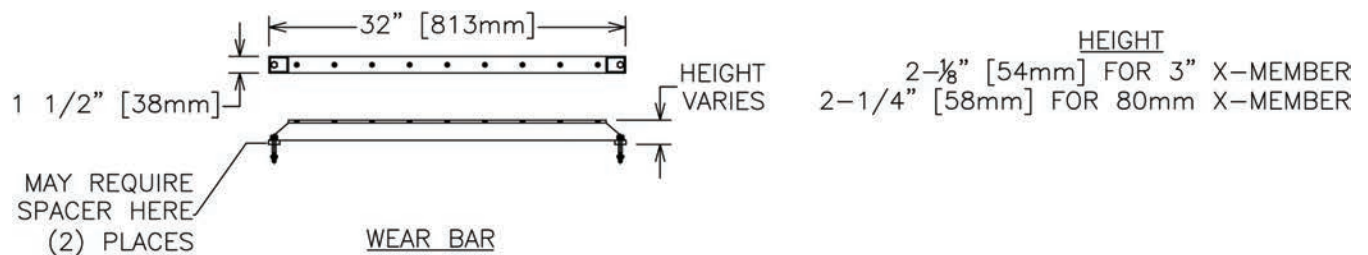


Figure 13

3.3.4 Complete the Installation of the Sub Deck

For drive units with 3.65" slats/planks:

Tubing for 3.65" flooring is on 3.65" centers (Figure 14).

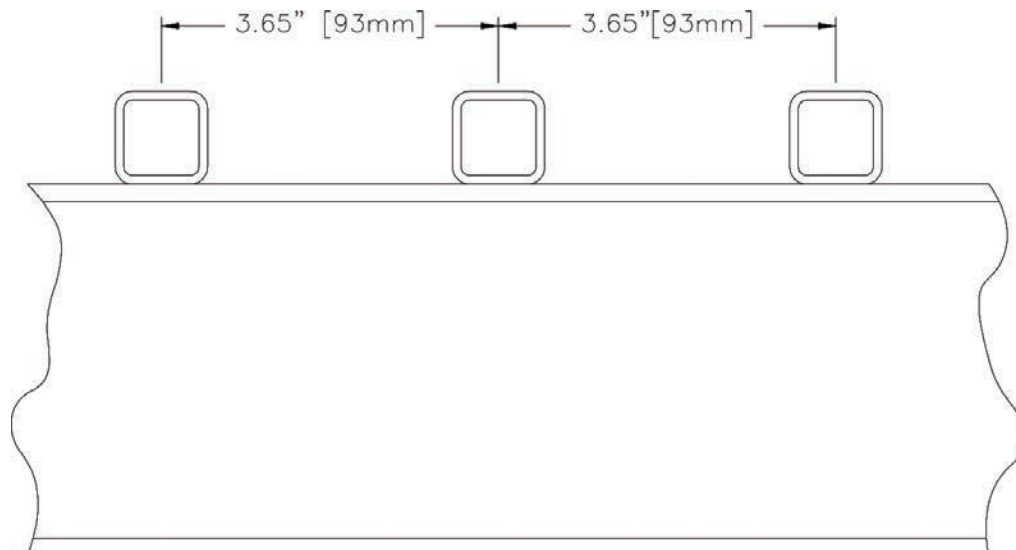


Figure 14

For drive units with 97 mm slats/planks slats:

Tubing for 97 mm flooring is on 97 mm centers (Figure 15).

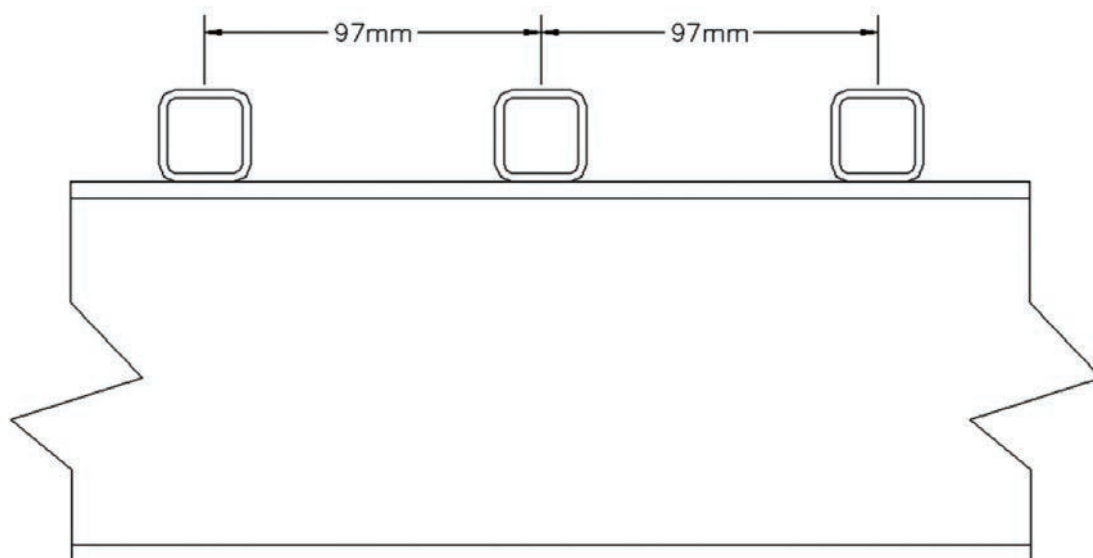


Figure 15

Place the remaining tubes in the trailer and clamp them down using the sub-deck jigs provided by KEITH Mfg. Co. Fasten the tubing to the cross-members by welding or bolting as detailed for the master above. Systematically work from one end of the trailer to the other end. Rotate the jigs, one at a time, so that one jig is always clamped over the last welded cross-member, while the other jig is moved forward to the next cross-member. Clamp the jig and tubes to every cross-member or every other cross-member, depending upon how straight the stock tubing is. Remember to allow for the sub-deck to overhang the formed cross-members on the drive unit. The sub-deck will also overhang the final cross-members at the front and rear of the trailer (Figure 9).

Excessive welding and too little cooling will cause cross-members to warp. Figure 16 shows a suggested welding pattern. Starting each pass on the same side of the trailer gives sufficient cooling time before moving to the opposite side.

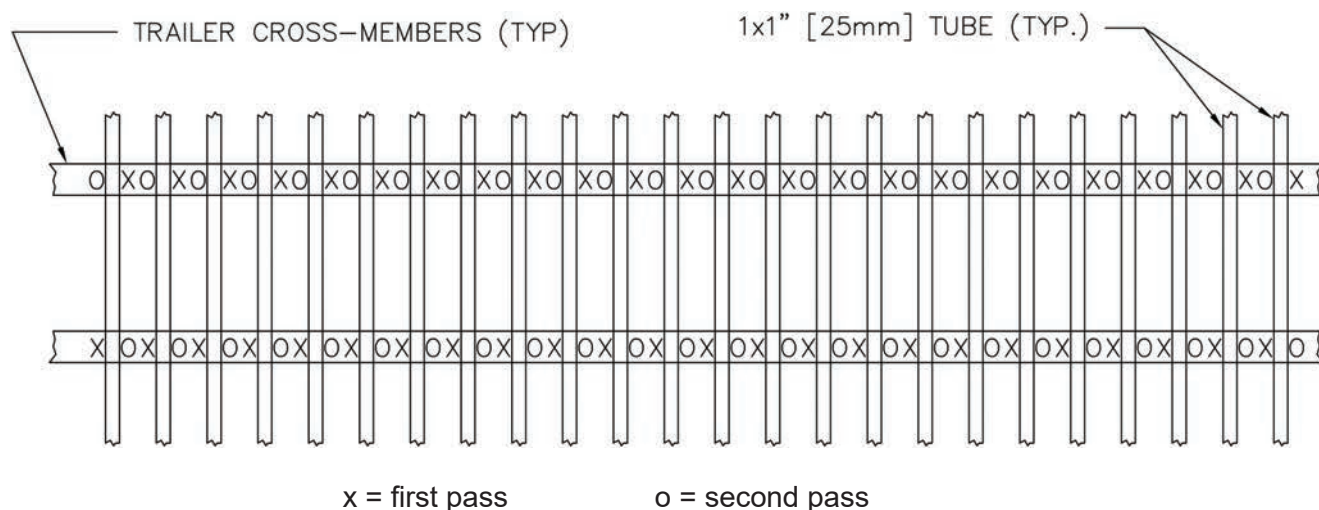


Figure 16

3.3.5 Door Threshold Sub-Deck

The end of the sub-deck, mounted over the baffle plate at the unload end, requires special consideration because the area is fully exposed when the floor slats/planks are in the forward position.

There are several options for completing the sub-deck at the rear threshold. Choose one of the following:

1) No modification

The square tubing extends over the baffle plate to the end of the stroke. The tubing may or may not be capped.

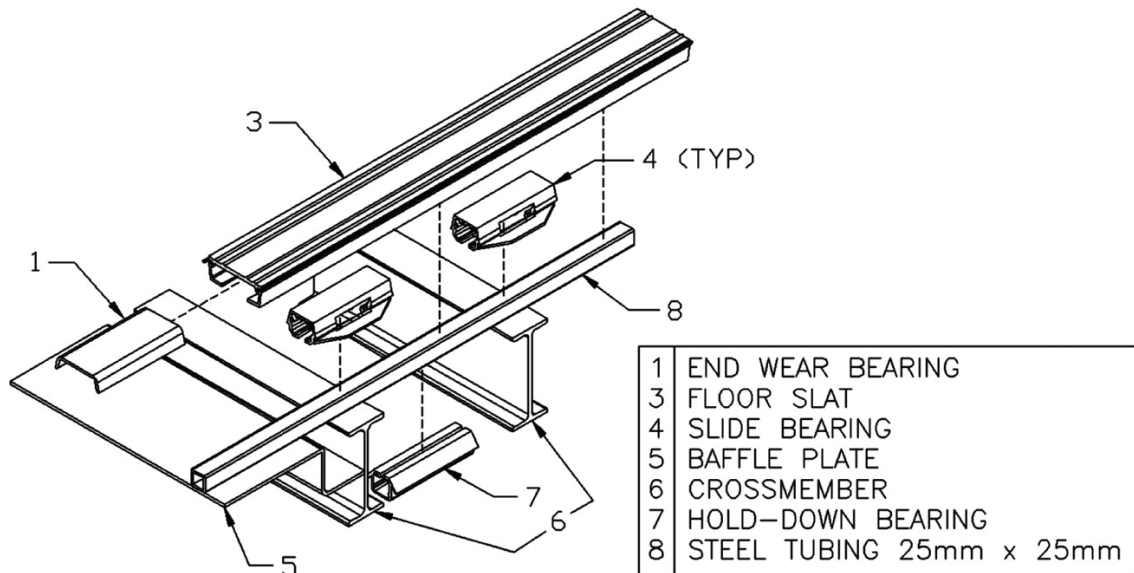


Figure 17

2) Solid steel bar

Solid 1" [25 mm] square bar stock meets the square tubing on the last crossmember and extends over the baffle plate to the end of the stroke. This method is recommended for hauling solid waste or other highly abrasive materials.

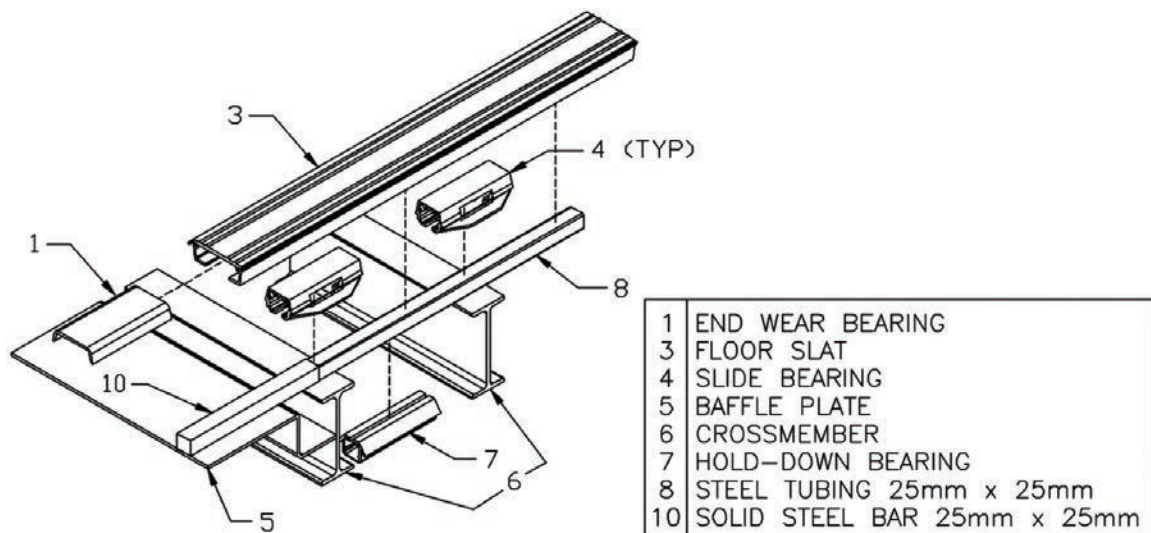


Figure 18

3) Solid aluminum bar

Solid 1" [25 mm] aluminum bar stock meets the square tubing or "U" channel extrusion on the last cross-member and extends over the baffle plate to the end of the stroke. A solid aluminum bar will provide a strong structure at the end when the baffle plate and sub-deck are aluminum.

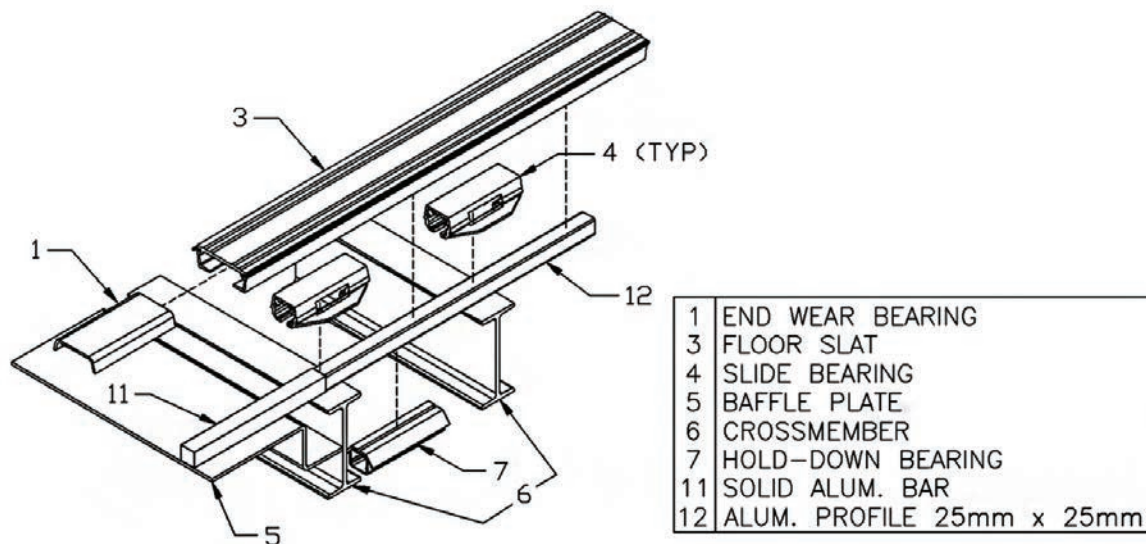


Figure 19

4) T-block

A plastic T-block is attached to the baffle plate, extending to the end of the stroke. T-blocks provide a sliding surface and prevent material from lodging underneath the slats. T-blocks are not recommended for use with highly abrasive materials.

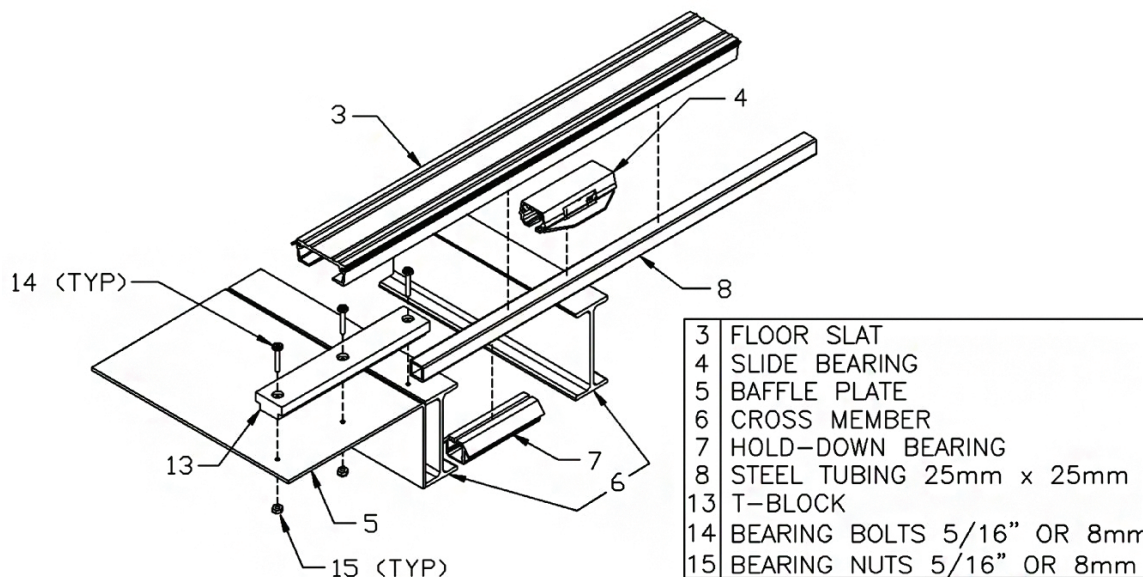


Figure 20

5) End Plug

When end plugs are used, the sub-deck cannot be extended to the end of the stroke. End plugs can be used when appearance is a major concern. However, end plugs are not recommended for use with highly abrasive materials.

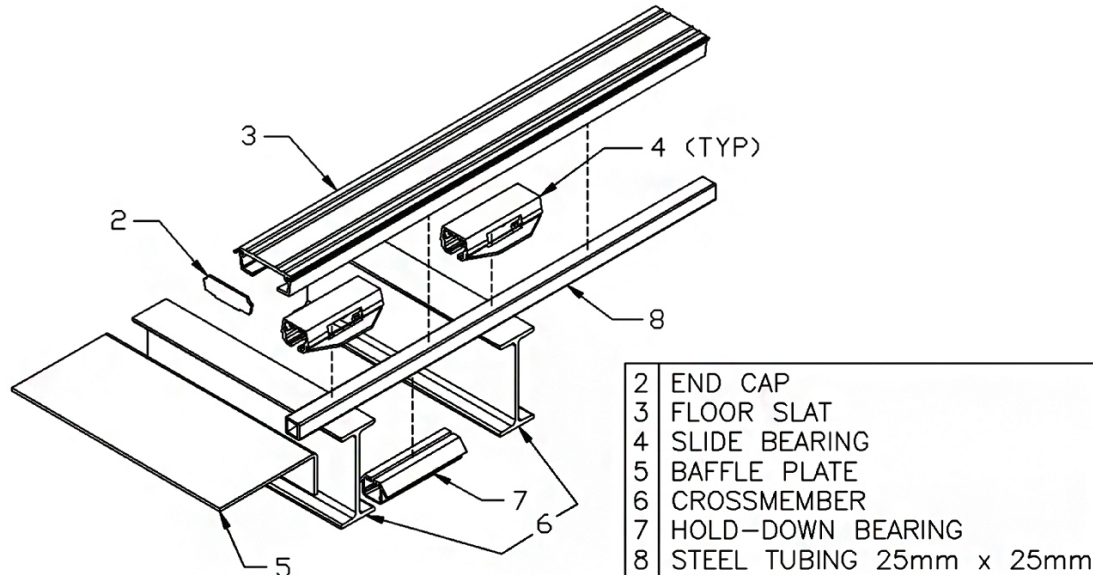


Figure 21

NOTE: The first three options include a wear pad bearing in the floor slats. The square sub-deck material can extend to a point of 1/2" [12 mm] from the inside of the door for all options except the floor plugs.

- 1) Install the selected end sub-deck following these instructions:

Option 1:

Extended steel tubing The rear sub-deck tubing is cut to length and installed as normal. If necessary, weld caps on the tube ends to prevent material from entering tube. Grind to give a smooth finish.

Option 2: Solid Steel Bar

- 1) Cut the solid bars to length 10" [250 mm] minimum, under normal conditions. Bars extend to 1/2" [12 mm] inside the closed doors.
- 2) Align the bars with the installed tubing. Clamp them down using the spacer jigs to align them.
- 3) Weld the bars to the baffle plate.

Option 3: Solid Aluminum Bar

- 1) Same as in Option 2.

Option 4: T-Blocks

- 1) Align the T-blocks with the installed tubing. Keep the blocks 1/2" [12 mm] away from the inside of the doors.
- 2) Clamp down the blocks. Drill and countersink bolt holes through the T-blocks and baffle plates. 3. Fasten the T-blocks to the baffle plate. Self-tapping screws may be necessary if access is difficult. Make sure the bolts (flat-head socket) are below the surface of the block.

3.3.6 Side Seal Preparation.

Side seal options are discussed in Section 3.6.2. Some of the options require spacers to be installed in order to mount the side seal.

- 1) Select a side seal option from Section 3.6.2
- 2) Install mounting spacers for the selected side seal option, if necessary.

Lay out the spacers so that the top of the side seal will be level with the top of the flooring when it is in place. Pieces of tube or angle can be attached on every other cross-member to mount the side seal. If hydraulic tubing will be routed under the side seal, make sure that the side seal mounts will not obstruct it.

3.4 Drive Unit Installation

3.4.1 Trim the Cross-Members

Trim the cross-members on the drive unit to fit inside the trailer side rails. Trim each end, allowing for a minimum of 1/8" [3 mm] clearance on each side for installation.

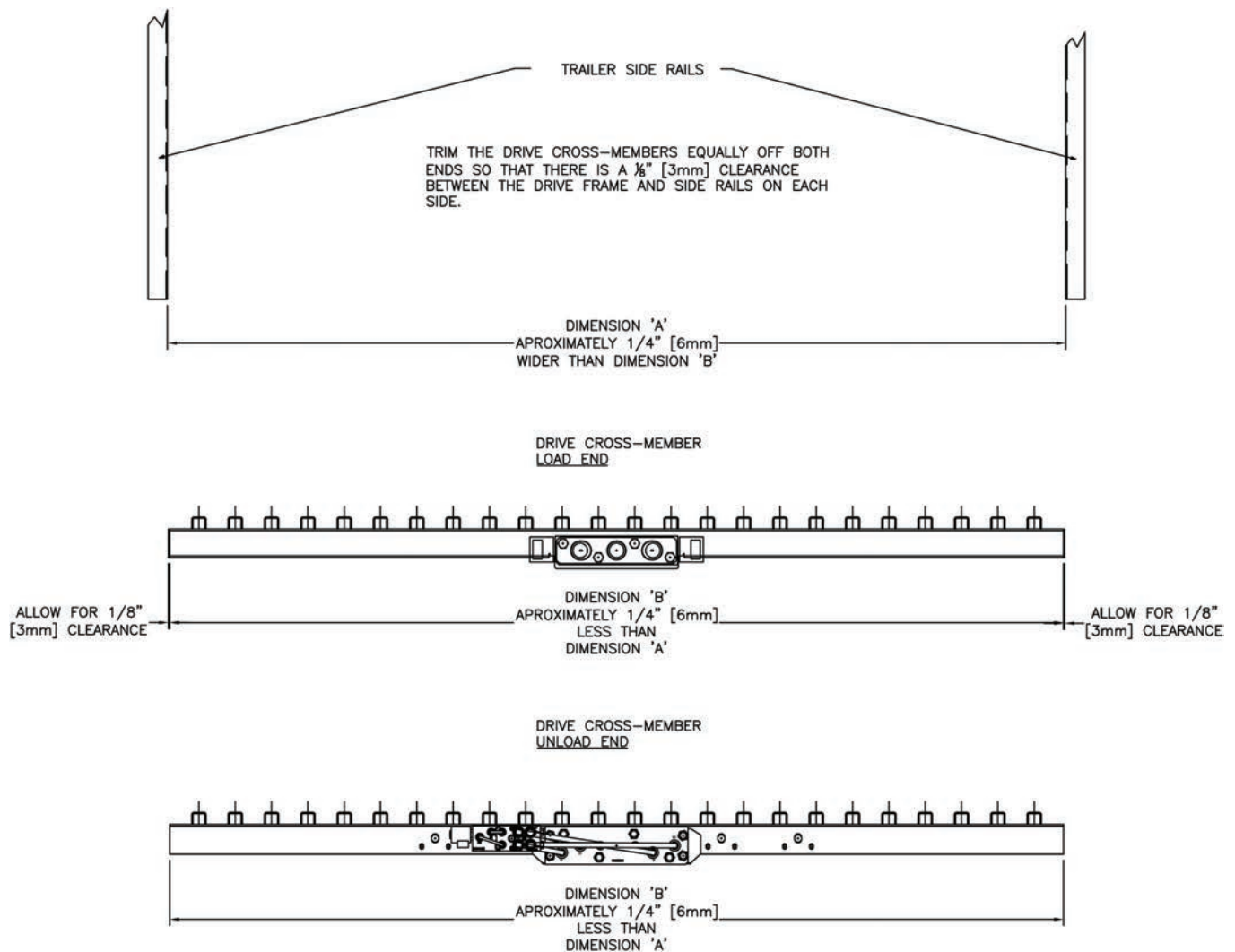


Figure 22

3.4.2 Line Up the Drive Unit

It is important to mount the drive unit square and centered on the trailer.

- 1) Position the drive unit. After the master 1" [25 mm] square tube is set and before the sub-deck is installed, the drive should be set in position, but not welded. The system can be lifted into place with a crane.

If the trailer top is closed or a lifting mechanism is not available, use the following method:

- a) Set a sheet of plywood inside the rear of the trailer.
- b) Place blocks on the sheet to protect the hydraulic tubing.
- c) Lay the drive unit on the sheet.
- d) Slide the sheet forward into the drive gap.
- e) Raise the rear of the unit so the front cross-member on the drive will clear the rear crossmember on the trailer.
- f) Lower the unit and slide it into position.

NOTE: A minimum drive gap of 65-9/16" [1665 mm] is necessary to maneuver the drive unit.

IMPORTANT: Do not lift drive unit by the hydraulic tubes or the piston rods.

- 2) Align and level drive unit.

Front to rear alignment

Position the drive unit in the drive gap. The 1" [25 mm] square tubing should extend 1 1/2" [38 mm] past the formed cross-members at each end of the drive unit. The cross-drives should be parallel to the trailer cross-members.

Side to side alignment

Recommended method:

After the sub-deck is welded or bolted down, use a straight edge to align the drive shoes with the corresponding 1" [25 mm] square tubing. Do this with at least two shoes on each side of the trailer (Figure 23).

Optional method if trailer is perfectly straight:

Align the drive unit's "centerline" marks with the trailer's centerline. There are centerline marks located on the top of both cylinder pack manifolds.

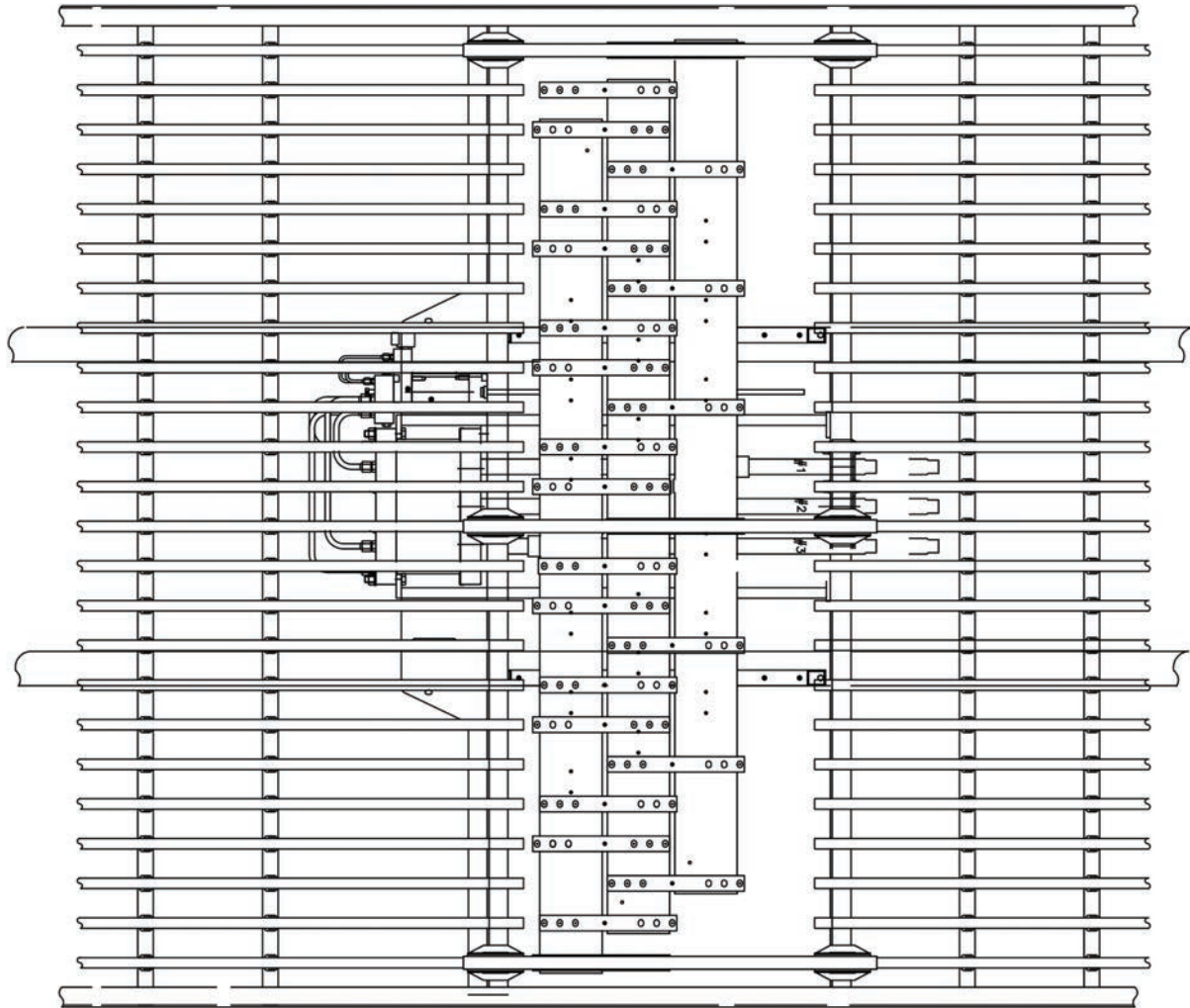


Figure 23

Drive Height

Place plastic bearings on 1" [25 mm] square tube at sides and center of trailer at each end of drive area. Lay a straight edge from bearing to bearing across the drive. Raise the drive so the top of the drive shoe touches the straight edge. Adjust the height of the top of the drive frame cross-members to the same height as the top of the trailer cross-members as detailed below. (Shim if necessary).

This method gives the proper drive height as bearings are 1/4" [6.4 mm] above the 1" [25 mm] square tube and the drive shoes connect directly to floor slats/planks (Figure 24).

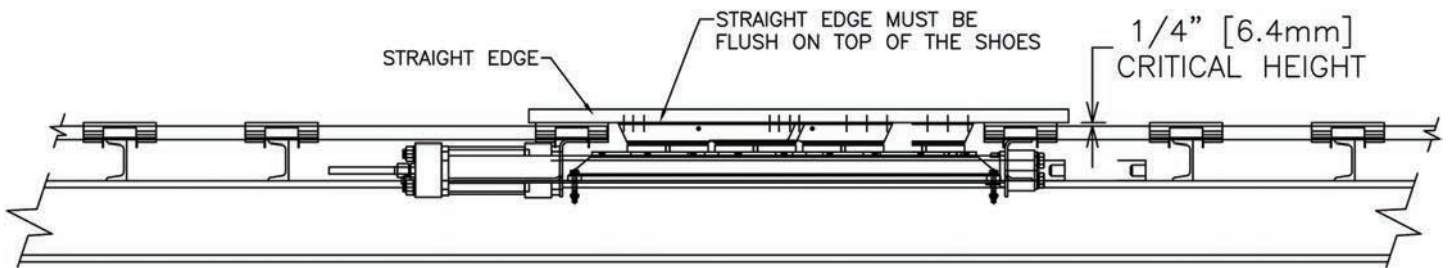


Figure 24

- 3) Secure the drive unit in place by welding or bolting it to the main frame rails, side rails and sub-deck.

Welding

Weld according to reference drawing D-52102. Remember to weld the 1" [25 mm] square tubing to the drive unit's formed cross-members.

Bolting

The size and number of fasteners required to secure the drive unit depends upon the type and thickness of the material the drive is being mounted to (see Appendix 6). If the steel drive frame is bolted to an aluminum chassis frame, a thin corrosion resistant barrier should be placed between them.

- 4) Weld or bolt cross bracing to side rails (Figure 25). Note that it is easier to install the flooring if the cross bracing is installed after the flooring. Keep in mind that the paint will have to be touched up afterward if this option is chosen.

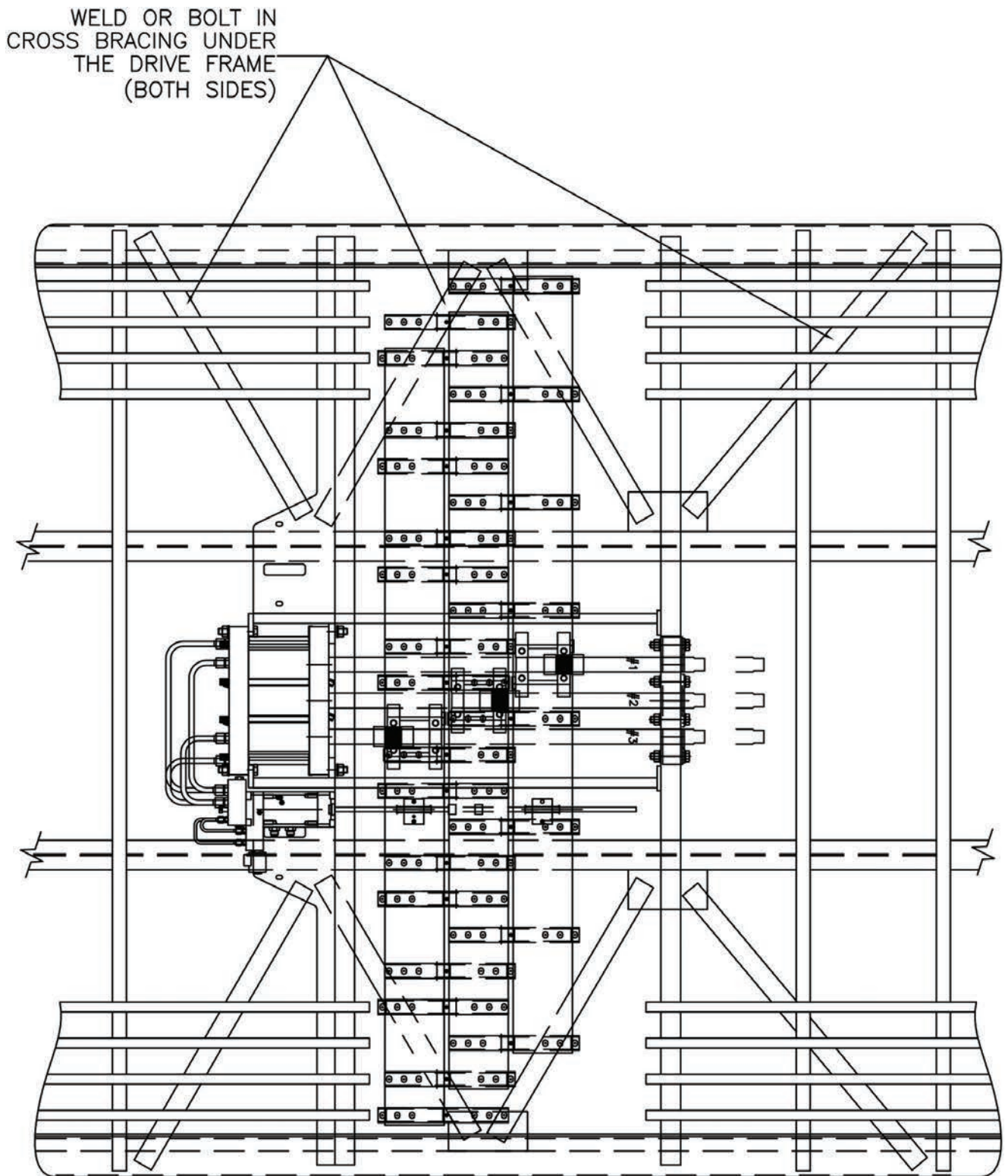


Figure 25

3.5 Painting

Drive units come painted with an oxide primer.

- 1) Confirm that the drive unit is well coated with primer.
- 2) Paint the cross-members and sub-deck with primer.
- 3) Paint the drive unit and sub-deck with a finishing paint, if desired.
- 4) After the paint dries, remove the protective cardboard covers on the cylinder rods.

IMPORTANT: Make sure that the following parts are protected when painting: chrome cylinder rods, switching valve rod, identification plates and any decals.

3.6 Flooring Installation

After the paint dries, the flooring can be installed. The slats/planks slide on plastic bearings. Hold-down bearings keep the slats/planks down. The aluminum floor slats/planks are bolted to shoes on the cross-drives.

3.6.1 Bearings

- 1) Compare bearing dimensions with cross-member flange width. The gap in the bearing should exceed the flange width of the cross-member. The standard bearing gap is 2-7/16" [62 mm]. Specialty bearings are available for flanges up to 4" [100 mm].

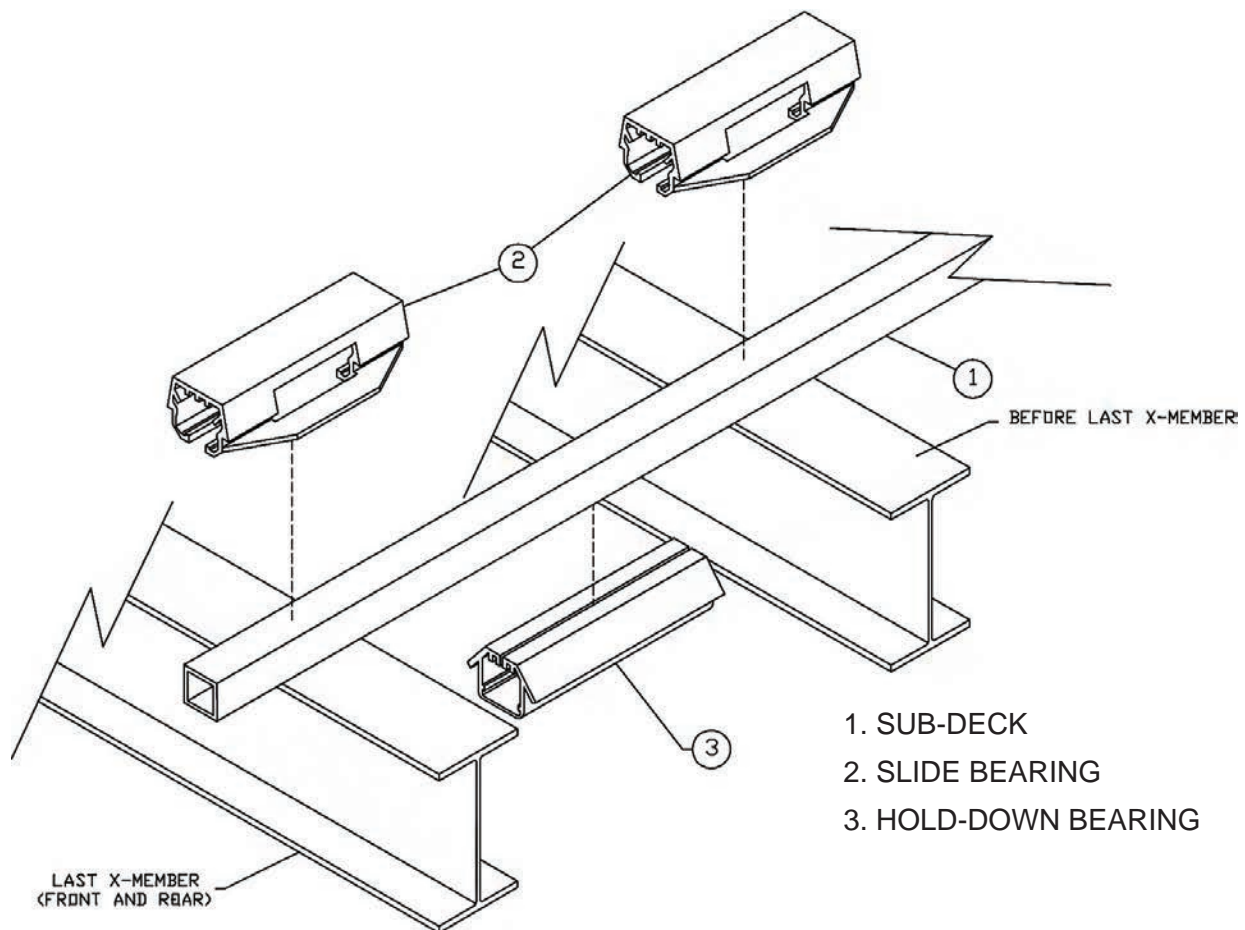


Figure 26

- 2) Snap slide bearings on the square tube at the junction of each cross-member. A rubber mallet works well for this procedure. (Figure 26).

IMPORTANT: Do not put a bearing on the front cross-member of the trailer if the floor slat will slide beyond the center of this bearing in the backward position.

- 3) Snap on hold-down bearings. These are placed between the last two cross-members, at the front and rear of the trailer. Install them upside down on the square tubing. Then rotate them around the tubing so the ears point downward. Note that more hold down bearings may be required when using splash bearing.
- 4) Splash Bearings. If splash bearings are desired, consult KEITH Mfg. Co. for a layout specifically suited to your application.

3.6.2 Side Seal Options

The side seal is a piece that fills the gap between the *WALKING FLOOR* system's slats/planks and the sidewalls of the trailer. A seal is needed between the slats/planks and the side seal to keep material from falling between them. Several options are available:

- 1) Use (Figure 27) to select a side seal option. Side seal gap width ('B') is the distance measured from the seal on the outermost floor slat/plank to the sidewall. The seal gap on the 3:65" flooring is .150" and for 79 mm flooring the gap is 1 mm.
- 2) Split slat if necessary.

Rip a floor slat/plank to fit sidewall as closely as possible. This is another reason trailer alignment is critical. Make sure that the side with the seal groove goes to the correct side of the trailer.

- 3) Mount side seal as necessary. If hydraulic tubing will be mounted underneath the side seal, wait until the tubing is installed. Make sure bolts are flush with the side seal. Run a silicone bead between the wall and side seal. If a wide gap exists between the side seal and the inside trailer wall, bridge the gap with flat bar or angle.

TO CALCULATE SIDE SEAL WIDTH:

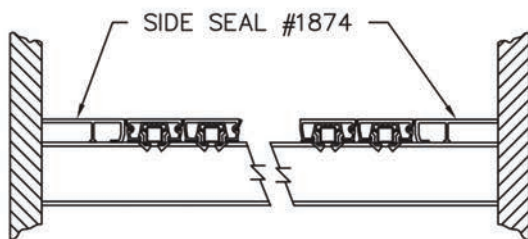
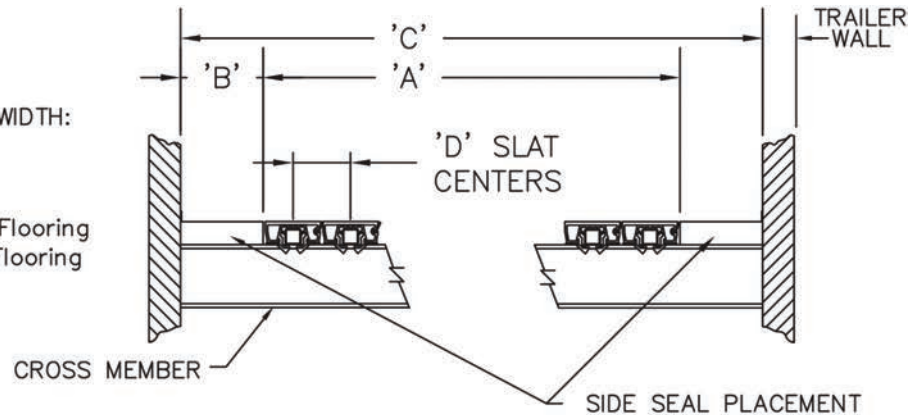
$$B = (C - A) / 2$$

WHERE: A =

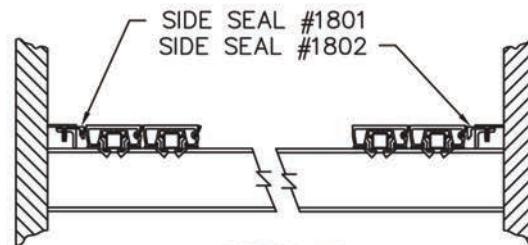
$DX(\# \text{ of slats}) + E$

$E = 1\text{mm}$ for $D = 97\text{mm}$ Flooring

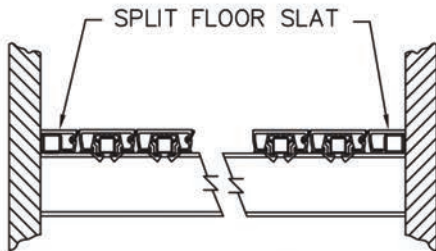
$E = .150"$ for $D = 3.65"$ Flooring



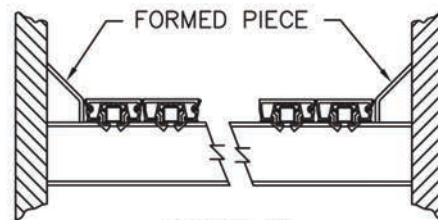
- OPTION #1
- USED WITH $7/32"$ & $3/8"$ FLOORING
 - REQUIRES ONE DOUBLE SEAL SLAT



- OPTION #2
- USED WITH $1/8"$ AND $7/32"$ FLOORING



- OPTION #3
- MAY REQUIRE SPLITTING OF TWO SLATS TO HAVE PROPER WIDTH
 - $1\ 1/4"$ [32mm] SPACER USED UNDER SLAT TO MAINTAIN PROPER HEIGHT



- OPTION #4
- REQUIRES ONE DOUBLE SEAL SLAT

OTHER OPTIONS MAY BE AVAILABLE BY CONTACTING KEITH MFG. CO.
ALL METHODS REQUIRE PROPER PLACEMENT OF SIDE SEAL TO ENSURE
A TIGHT FIT

Figure 27

3.6.3 Floor Slats/Planks

The correct style and length of the floor slats/planks for the application should have been already determined when ordering the drive kit from KEITH Mfg. Co. It is important to verify that the slats/planks received with the kit are the correct length.

- 1) Determine the correct length of the floor slats for a KMD drive unit 6" [150 mm] stroke system. The slats/planks reach from 1/2" [13 mm] minimum inside the doors, to 9" [230 mm] minimum from the closest point on the front bulkhead wall at floor level. This suggests that the maximum length of the slats/planks is 9-1/2" [242 mm] shorter than the inside dimension of the trailer, with the doors closed.

WARNING: Make sure that the slats will not hit anything at the forward end of the stroke. Be particularly careful with bull nosed trailers. Check for round shaped walls. If it is necessary for any reason to shorten the floor slats, contact KEITH Mfg. Co. for detailed instructions.

- 2) Install floor slats/planks.

IMPORTANT: The drive rods must be in the absolute rear (collapsed) position in order to attach the floor slats to the cross-drives correctly. Drive units are sent from KEITH Mfg. Co. in this position. However, it is possible for them to shift during shipping. To determine if they are in the correct position, note that all three drive rods should be sticking out of the bearing block evenly (approximately 2" [50 mm]). In newer models this dimension is closer to 1-1/4" [32 mm]. Another indication can be found by looking at the paint on the drive rods near where they enter the cylinder pack. The factory paint should normally extend up the rods to the cylinder manifolds with no chrome showing. If the drive rods are not in the correct position, carefully tap them into position with a plastic dead blow hammer.

The easiest way to install the flooring is to snap the slats down onto the bearings. It is also possible to slide slats into position over each of the bearings from the end.

The first slat installed in the trailer will be a slat with a single seal on one side only. Begin by installing this slat on the curbside of the trailer, with the ball seal on the curbside. Install the slats into the trailer, centering them on a row of bearings. Pound them down with a stomper (Figure 28), one at a time, working your way down each slat from one end of the trailer to the other end. Finish on the opposite side, noting that the slat with the double seal should be installed last.

Make sure that the hold-down bearings are all locked into position underneath the slats and that all the ball seals are 'standing' up (i.e. not folded down).

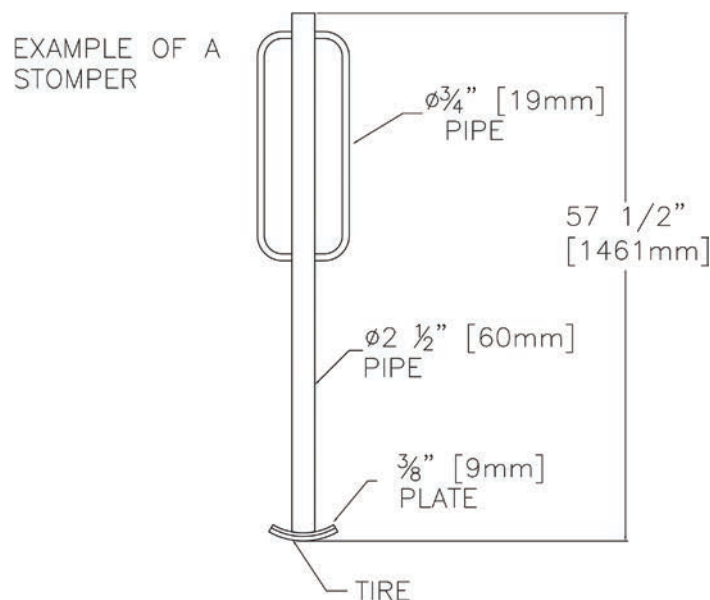


Figure 28



- 3) Fasten floor slats/planks to the shoes.
- Line the ends of the slats up in a straight line along the rear end of the trailer at the desired end of stroke. (A minimum of 1/2" [13 mm] inside of the closed doors). Clamp them all down so that they cannot move.
 - Use a 5/16" [8 mm] extension bit to drill up through the aligning holes in the bottom of the outer shoes of each cross drive (six places=two per cross-drive). Note that this hole is the only hole through the bottom of each shoe and that there are no threads in the corresponding hole in the nut bar. (Figure 29)

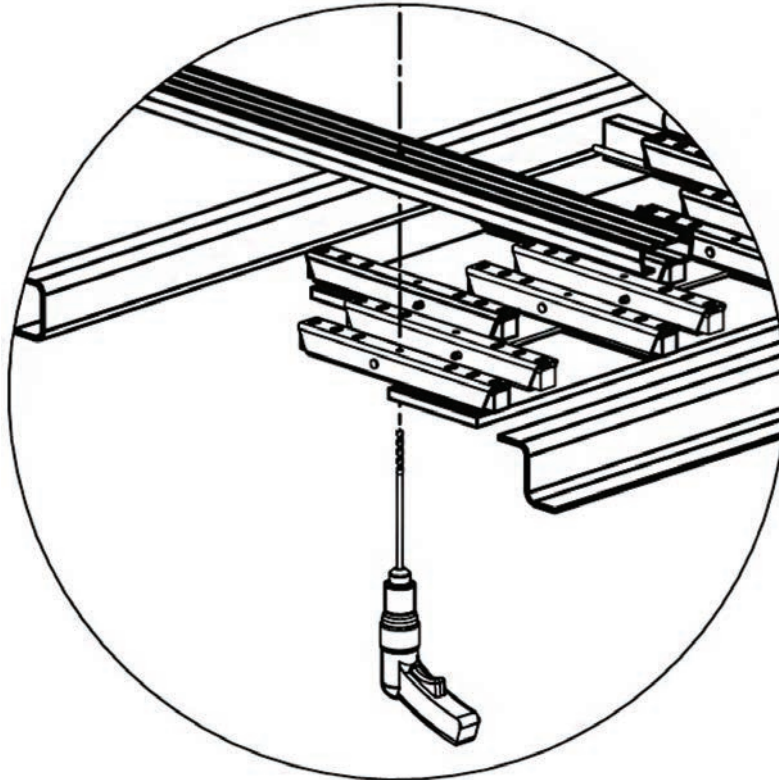


Figure 29

- c) Set the 7-hole drill jig on top of the floor slats. Note that small hole in the series is used to align the jig, but it is not in the center of the pattern and must be in the proper orientation for aligning the jig properly. Determine the proper orientation for the jig and align it along one crossmember by inserting two 5/16" [8 mm] bits through the jig into the holes drilled through the slats (one in each end of the jig). Note: Put a few layers of tape on the bit at the point Figure 29 where the flutes run out and insert the smooth end of the drill through the holes to line up the jig.)

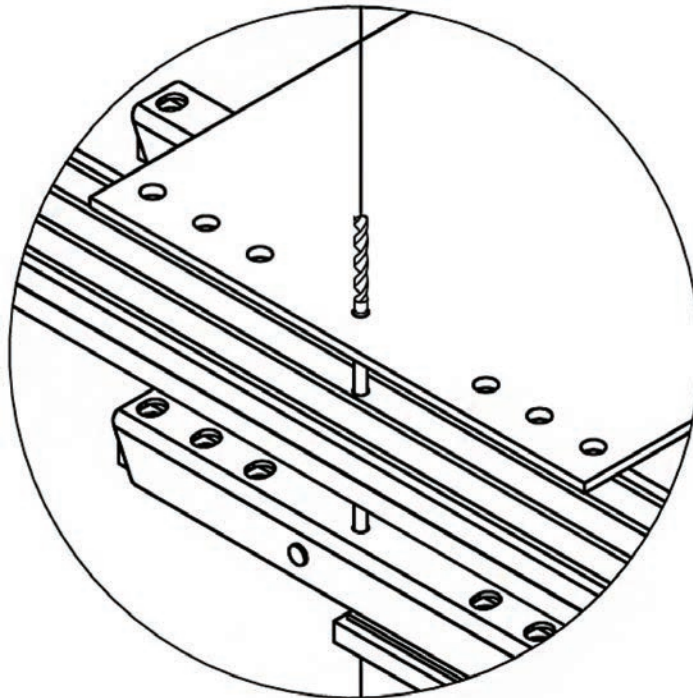


Figure 30

- d) Drill each of the 1/2" [13 mm] holes, being careful to drill only through the slat/plank and not into the nut bars that sit at the bottom of each shoe. Note: One method of achieving the correct drill depth is to measure the thickness of the jig-slat/plank combination and mark the 1/2" [13 mm] drill bit with tape before beginning. (Figure 31).

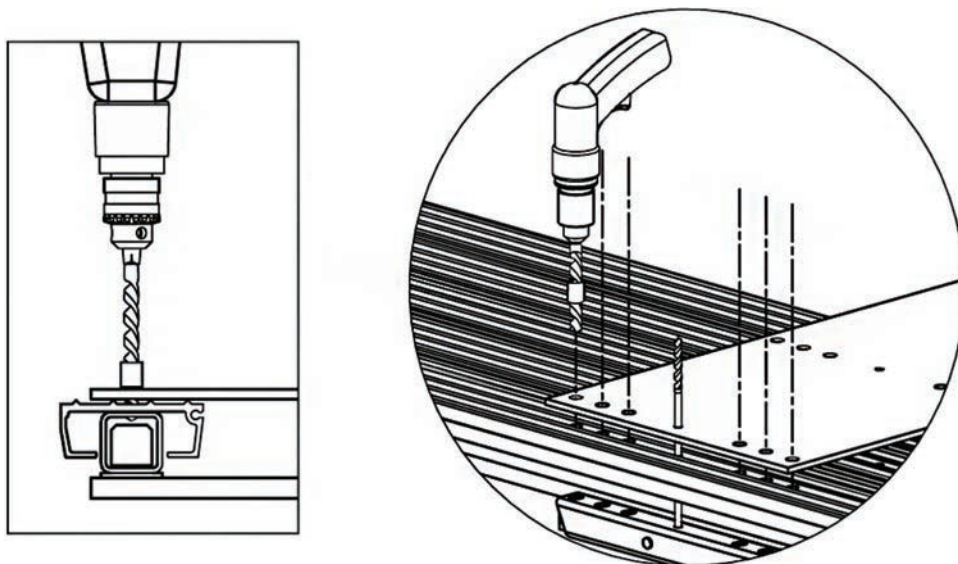


Figure 31

- e) Remove the drill jig and repeat the process until the holes have been drilled for all three cross-drives. (Note that the number one and two cross-drives have the same orientation, but the jig will have to be turned around or flipped over in the opposite direction for drilling holes in the slats in order to attach them to the number three cross-drive).
- f) Countersink each of the 1/2" [13 mm] holes with a 1"x 90° countersink until the floor bolts can be inserted flush with the top surface of the slat/plank. (Figures 32 and 33).

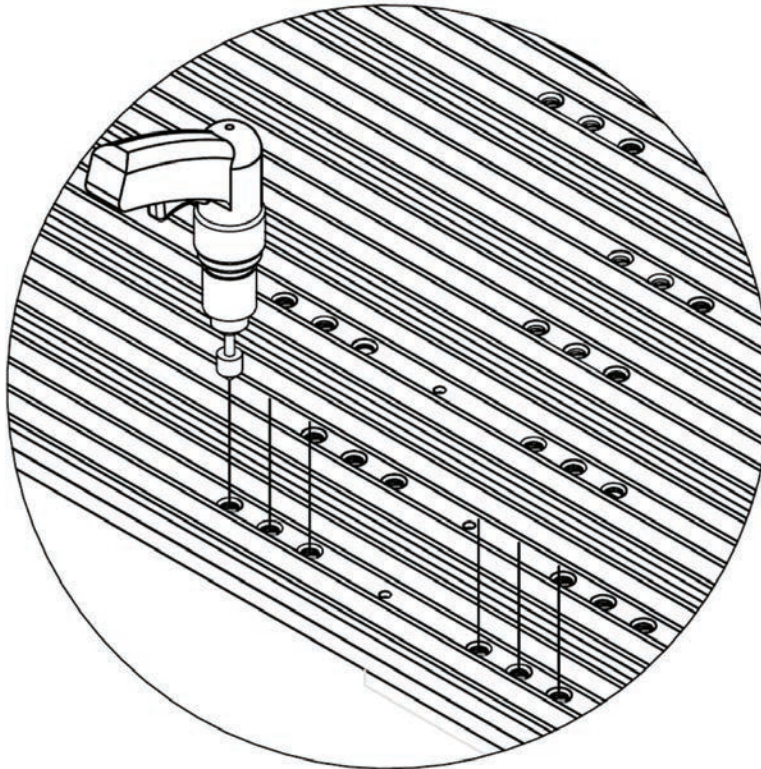


Figure 32

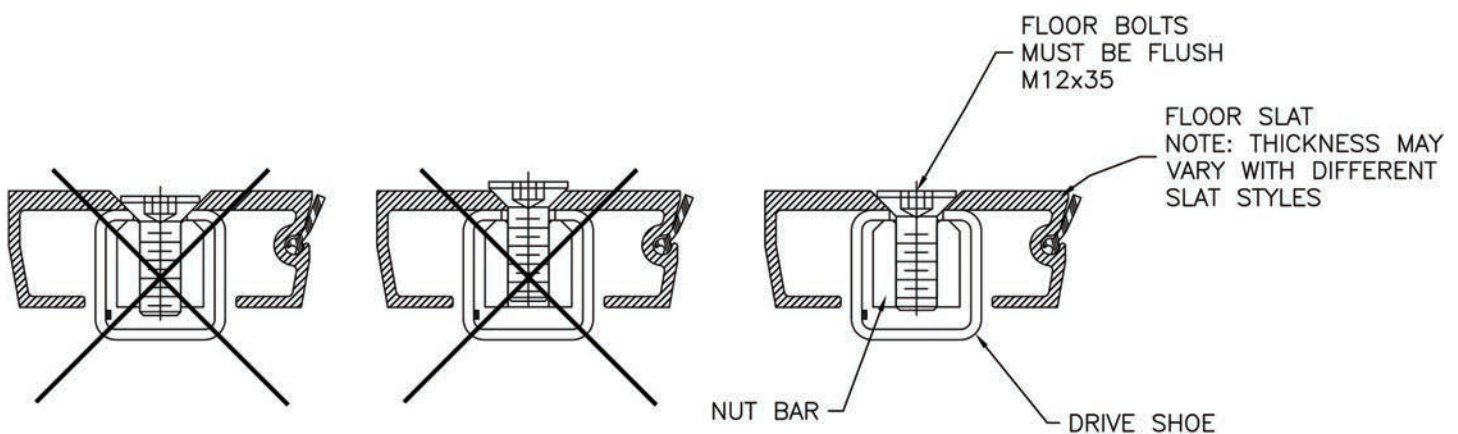


Figure 33

IMPORTANT: Do not over-countersink. This will allow the floor slat to come loose. Use extra caution when countersinking thin flooring.

- g) Blow off the chips.
- h) Generously apply #243 Lock Tight to each floor bolt and install bolts with an impact driver. Complete the process by tightening bolts to a torque of 110 ft.-lb [150 Nm] with a 8 mm hex bit and a torque wrench.

IMPORTANT: Properly torquing the bolts is necessary for long floor life.

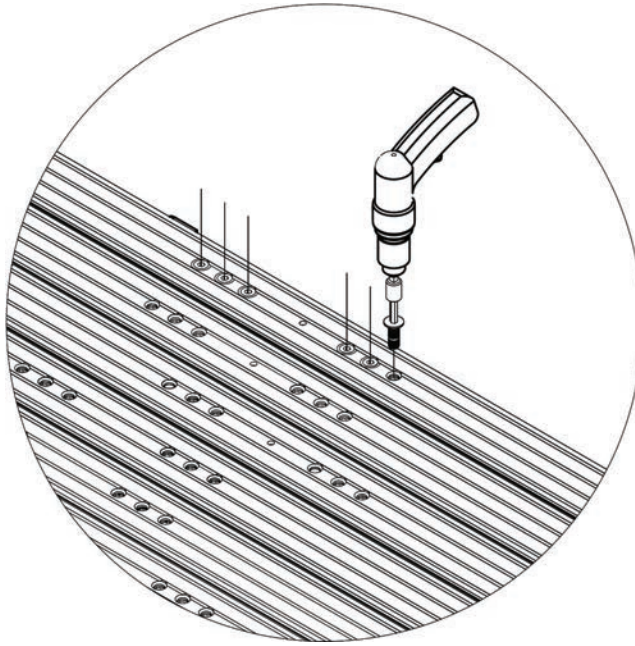


Figure 34

- i) Pre-drill each of the six, 5/16" [8 mm] holes to line up the seven-hole jig with a Letter T or 9 mm drill (through the aluminum slat/plank and aluminum nut bar only).

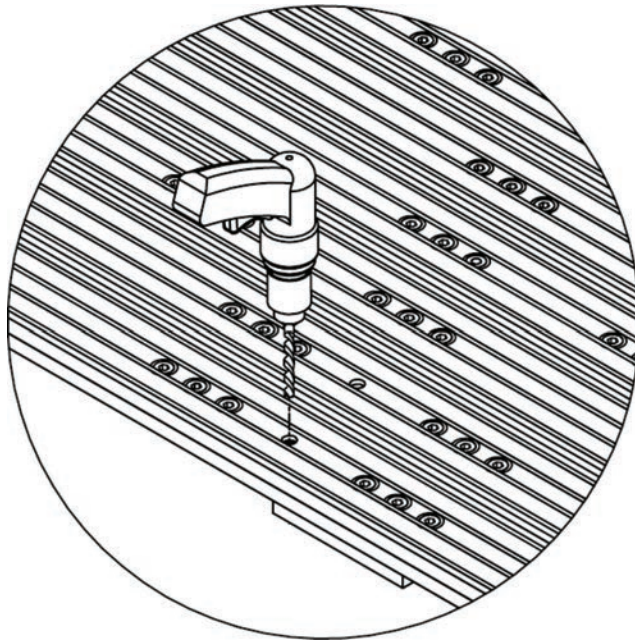


Figure 35

- j) Countersink each of the six holes with a 3/4"x 82° countersink until the thread cutter bolts can be inserted flush with the top surface of the slat/plank. Blow off the chips.

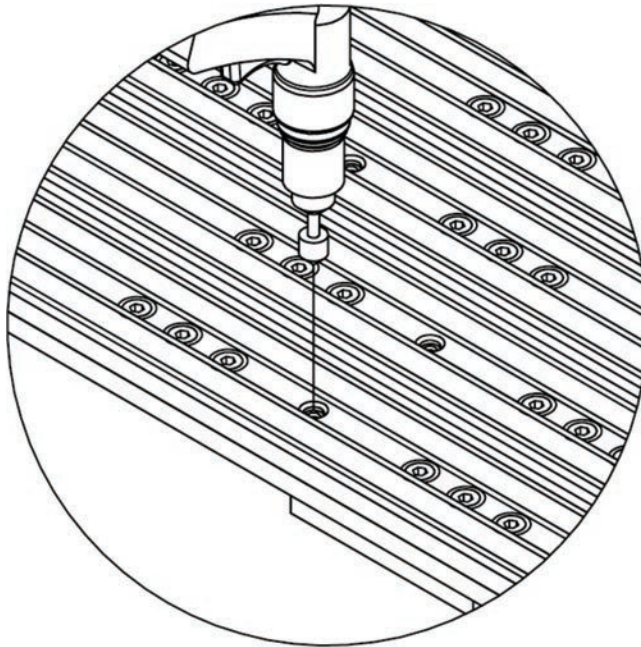


Figure 36

- k) Generously apply #243 Lock Tight to each thread cutter bolt and torque them to 25 ft-lb [32 Nm] using a #30 torx bit.

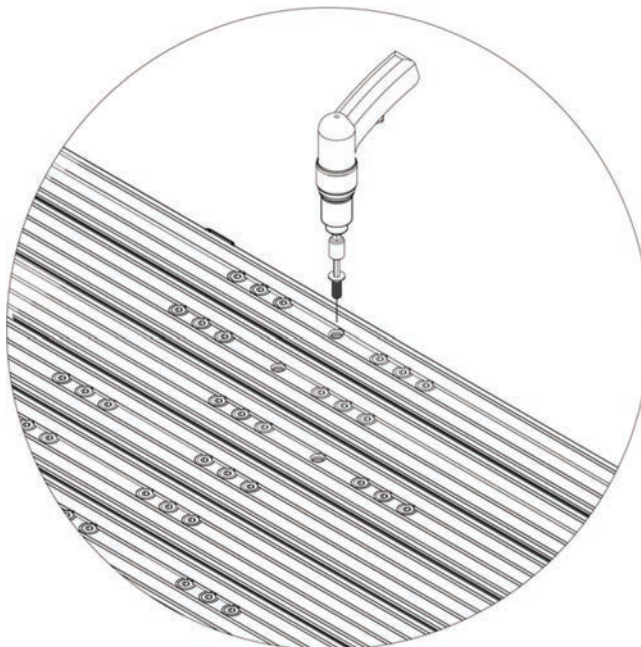


Figure 37

3.7 Front Shield Installation

- 1) The slope shield covers the stroke at the front end of the trailer, covering the pinch point and preventing material from falling through. The correct style and length of the front shield for the particular application should have been already determined when ordering the drive kit from KEITH Mfg. Co. The width should be approximately $\frac{1}{2}$ " [13 mm] less than the inner trailer width, which allows for $\frac{1}{4}$ " [6 mm] of clearance on each side. Trim the shield if necessary.
- 2) Provide clean-out holes below the slope sheet. This allows small amounts of material to fall through, if necessary. Make sure that the clean-out holes are covered or made in such a way that hands cannot be inserted while the floor is operating.
- 3) Mount the front shield.

The front shield is angled approximately 45 degrees. Place the shield in its final position. When the floor slats are in the rear position, the wear strip must still sit fully on top of the floor slats. Mark and mount 2" x 2" [50 mm x 50 mm] angle below the slope shield to the side walls. Bolt the shield to the side angles and front wall of the trailer. (Figure 38).

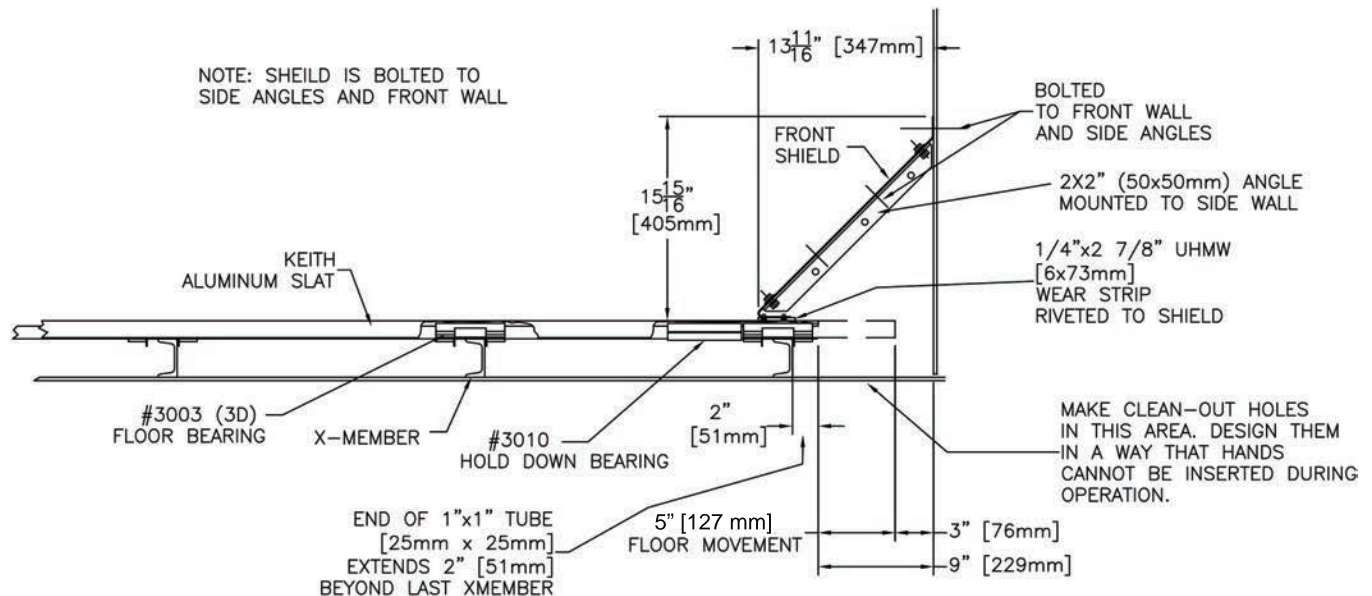


Figure 38

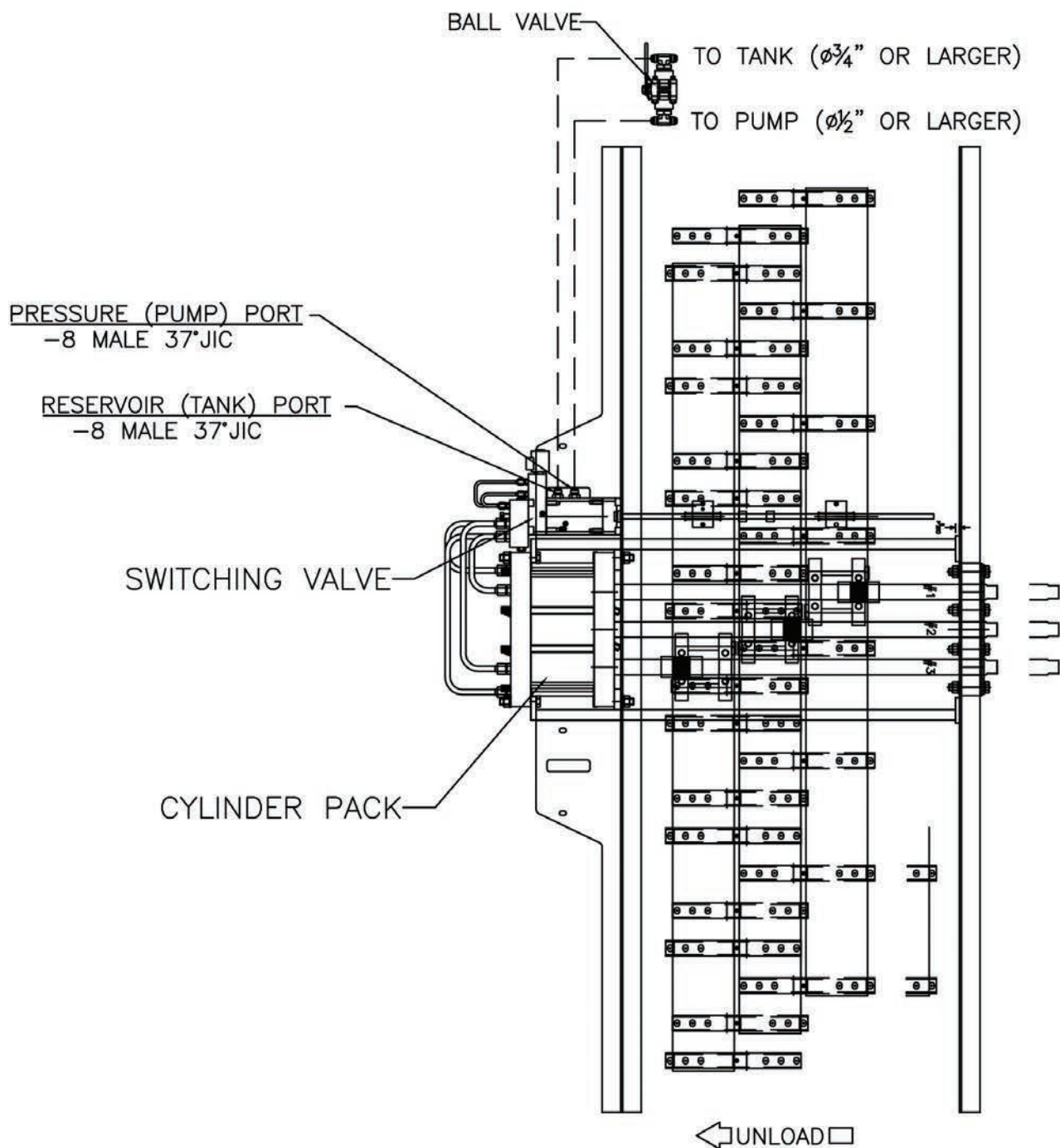
3.8 Plumbing Installation

Section 2.2 discusses the location of hydraulic tubing.

IMPORTANT: All components and tubing must be kept absolutely clean to prevent dirt from entering the system.

- 1) Consult the plumbing diagrams located in the appendix. For optimal performance, it is recommended that a pressure compensated variable displacement pump be used with this system. Lay out all necessary fittings. Determine tube locations and lengths. Use rubber grommets or PVC tubes to protect the tubing when installing tubes through cross-members. Installing the tubes underneath the side seal or cross-members requires fastening the tubes with clamps. Make all bends with sweeping elbows to reduce heat build up. Keep the number of bends to a minimum.
- 2) Connect the tubes to the drive unit. $\frac{1}{2}$ " (-8) hoses should be used to make connections between the switching valve on the drive unit and the $\frac{1}{2}$ " (-8) ball valve. Connect the pressure line to the switching valve port labeled "PUMP". Connect the return line to the switching valve port labeled "TANK". Note that it is recommended that the pressure lines be a minimum of $\frac{1}{2}$ " (-8) and return lines (between the ball valve and the reservoir) should be a minimum of $\frac{3}{4}$ " (-12).

DRIVERS SIDE



HYDRAULIC PLUMBING DETAIL (VIEW FROM THE TOP)

Figure 39

4.0 Miscellaneous

4.1 Trailer Wires and Lines

Make sure that electrical wires and lines cannot be damaged by moving parts. Mount them so they are not rubbed by moving parts. Check for proper light and brake performance.

4.2 Caution Decals

Place the supplied caution stickers on the sides of the vehicle above where the drive unit is located. One sticker should be near the *WALKING FLOOR* system's controls.

4.3 Front Guard Shield

A screen or plate with holes needs to be mounted under the front of the trailer to deny access to the front end of the slats so they cannot pinch or shear anything entering from below.

5.0 Appendix 1 - Retrofit Bracing

Trailer bracing prevents warping.

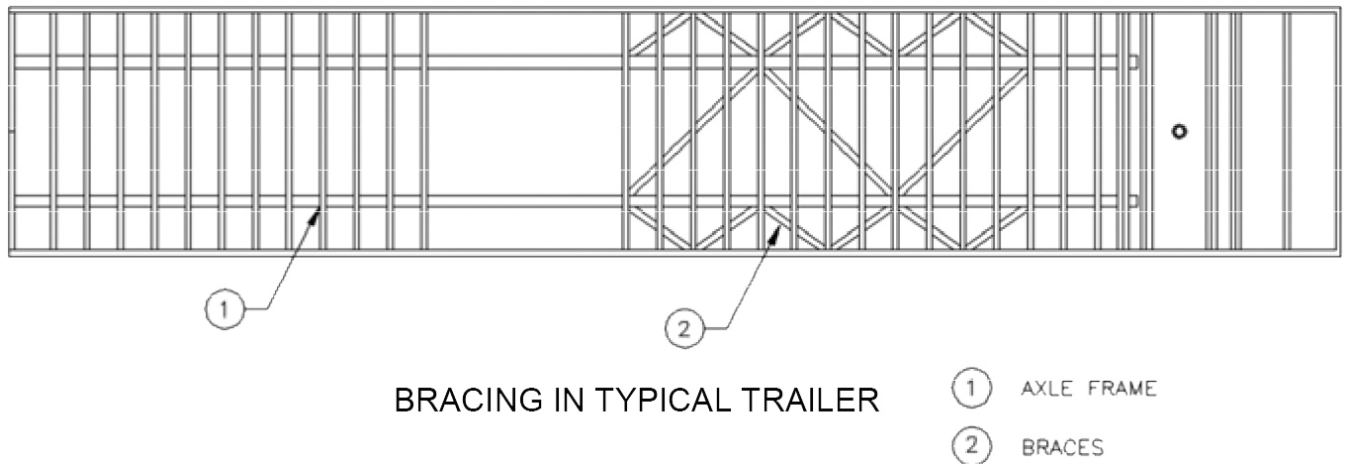


Figure 41

- 1) Install bracing as shown in (Figure 41) It is best to add bracing before removing the old floor because the floor keeps the trailer straight. If flat bar is used, make a cross bracing, because it will buckle easily under compression. Steel angle does not require a cross bracing. Make sure there is enough wheel clearance when installing steel angle. The bracing reaches to the drive opening. Weld or bolt the braces to each intersecting cross-member.
- 2) Remove old flooring.

Trailer Alignment

Check the compatibility of the drive unit with the trailer before making any alterations to the trailer. Reposition cross-members for a retrofit, if necessary.

- 1) Adjust the trailer to meet these conditions:
 - a) The trailer must be straight to allow for proper parallel movement of the slats/planks. Determine straightness by sighting down a floor slat positioned next to the wall in the trailer. If the trailer sides are more than 1/8" [3 mm] out of straight, the side rails need straightening.
 - b) The cross-members, on which the sub-deck mounts, must be level. Because of the friction-based principle of the *WALKING FLOOR* system, it requires a flat floor. If there are deviations exceeding 1/8" [3 mm], make corrections. Ensure that the last beam of the trailer at the rear door threshold is level with the cross-members.

6.0 Appendix 2 - Tools Required for Installation

Jigs provided by KEITH Mfg. Co.

- Spacer jigs (3) (for alignment of the sub-deck)
- 7-hole pattern floor jig (1)

Basic tools not supplied with kit

- 30' [10M] tape measure
- End wrench set up to 1-1/2" [38 mm]
- 3/8" [6 mm] and 1/2" [12 mm] ratchet set with extensions up to 12" [300 mm]
- Allen wrenches
- Dead blow hammer
- Hammer
- C-clamps
- Hack saw
- Hand grinder
- 3/8" [6 mm] and/or 1/2" [12 mm] hand drill with drill bit set
- Straight edges
- Impact driver (1/2" [12 mm] drive)
- String line

Special tools

- Flaring tool for hydraulic tubing
- 5/16"x 12" long aircraft extension drill bit or 8 mm x 300 mm equivalent
- 1/2" Drill bits (floor bolts) (13 mm)
- Letter T drill bit or 9 mm (pre-drill for 3/8" thread cutters)
- 3/4" x 82° Countersink
- 1" x 90° Countersink
- 5/16" or 8 mm hex bit sockets (1/2" drive)
- #30 Torx socket
- Torque wrench up to 70 N-m
- Torque wrench up to 250 N-m
- Mig welder (wire welder)
- Overhead crane (hoist or forklift)
- Circular saw
- Cutting torch
- Flow meter
- Floor slat/plank stomper KEITH Part #11310701

Optional

- Knee pads
- Band saw



Miscellaneous

- Hydraulic sealant
- Primer & Paint
- Lock Tight (243 Medium Strength Thread Locker or equivalent)

Materials supplied in a standard drive kit:

KMD Drive unit

Floor Slats/planks

Slide (3D) Bearings

Hold Down Bearings

12 mm x 35 mm floor bolts (six per slat/plank)

3/8" x 1-1/2" thread cutting bolts (six per drive) (Slat/plank hole plug)

1x1 floor jigs (3)

7-hole pattern floor jig (1)

Caution Decals

Options NOT provided with standard kit

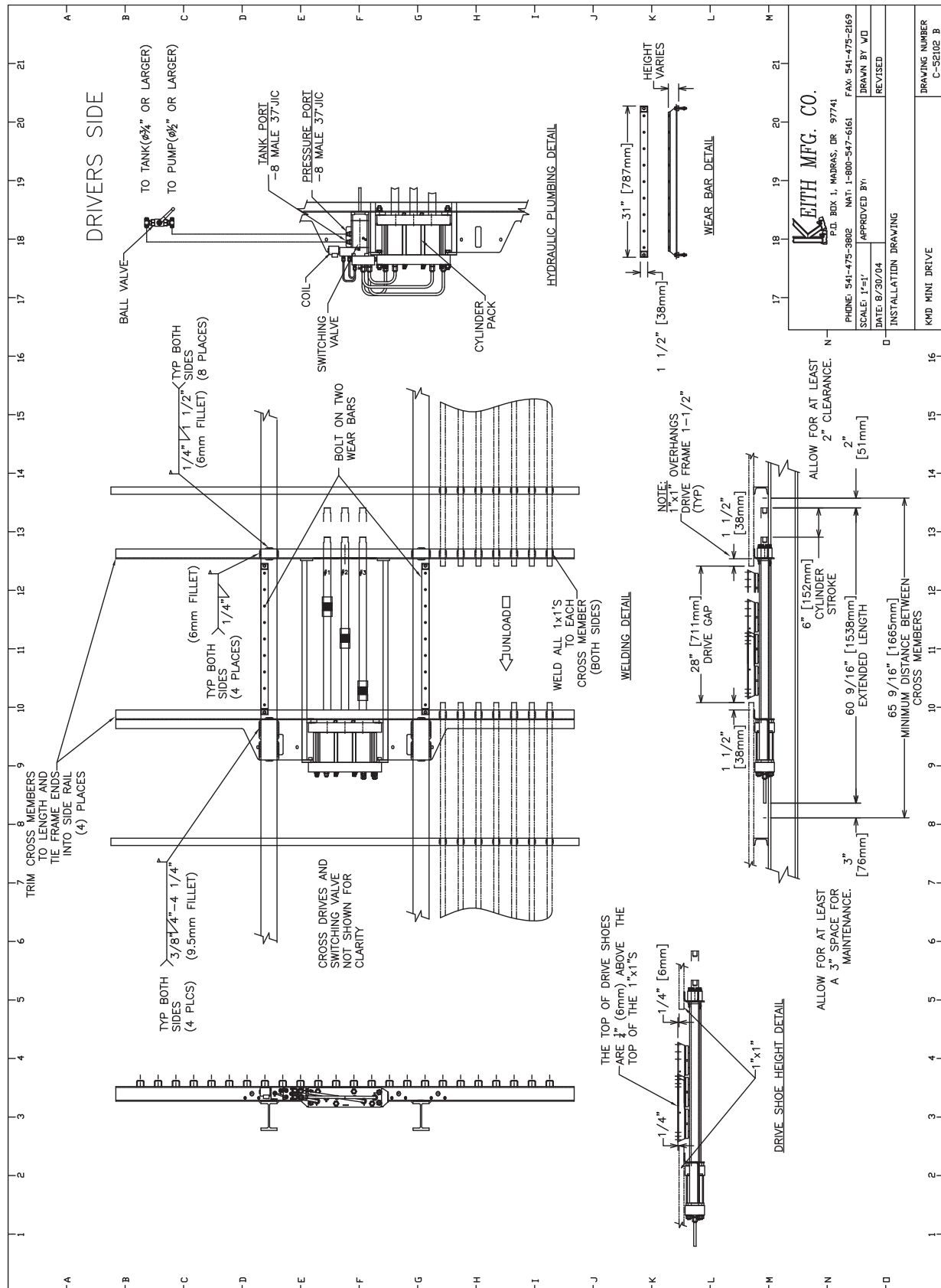
- Sub-decking 1"[25 mm] sq. steel tubing or aluminum U extruded channel)
- Hydraulic tubing
- Hydraulic quick couplers/ fittings
- Hydraulic hose
- Baffle plate material
- Side seal support
- Front shield
- Splash bearing
- Aluminum wear strips
- Tube clamps
- UHMW T-blocks
- Tubing end caps
- Floor slat plugs
- Rubber grommets

7.0 Appendix 3 - Reference Drawings

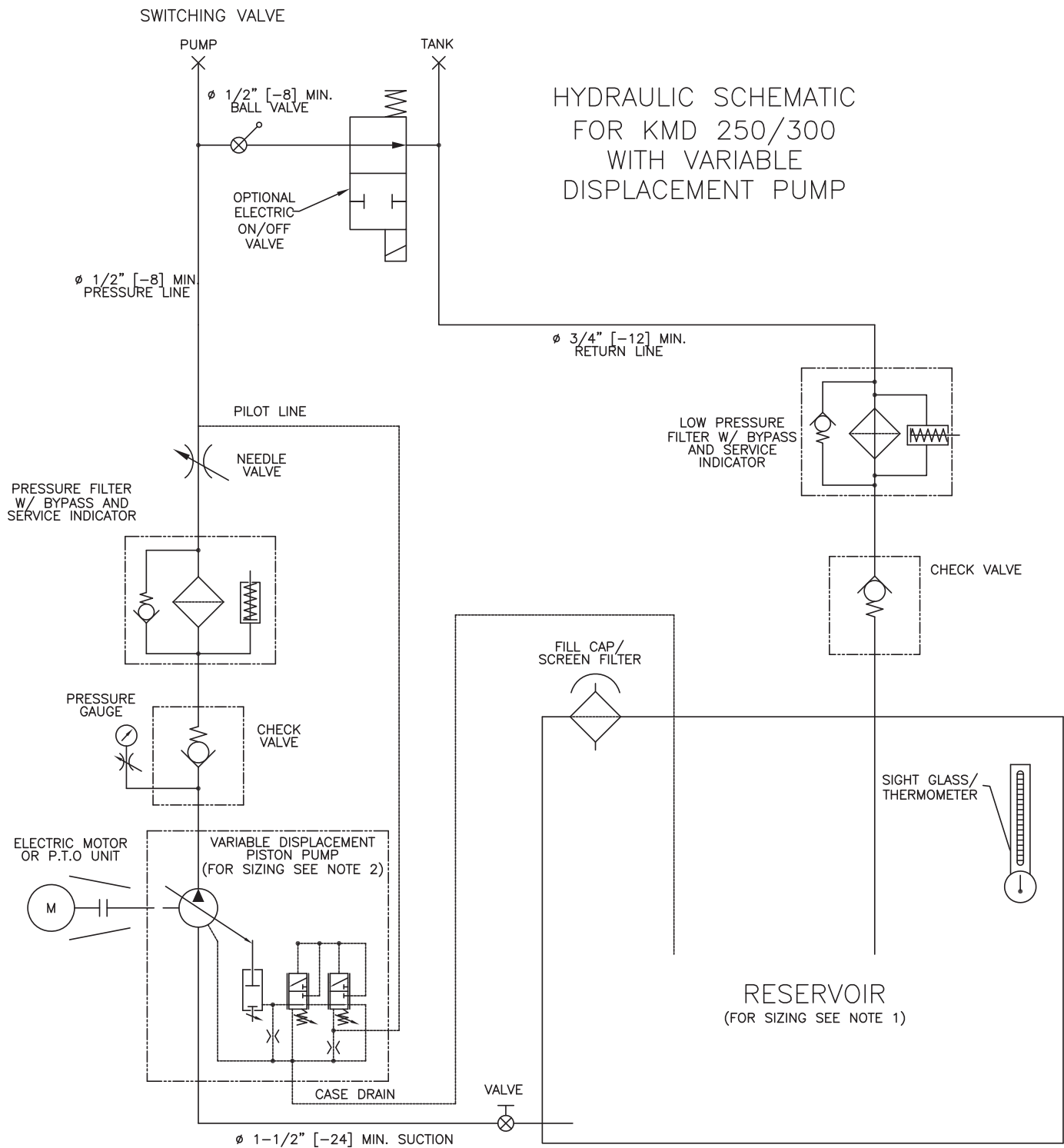
Includes scaled down copies of the reference drawings. Full-scale reference drawings also accompany the installation manual.

Reference drawings accompanying installation manual

• Drive installation - 52102



- Hydraulic Schematic with Variable Displacement Pump

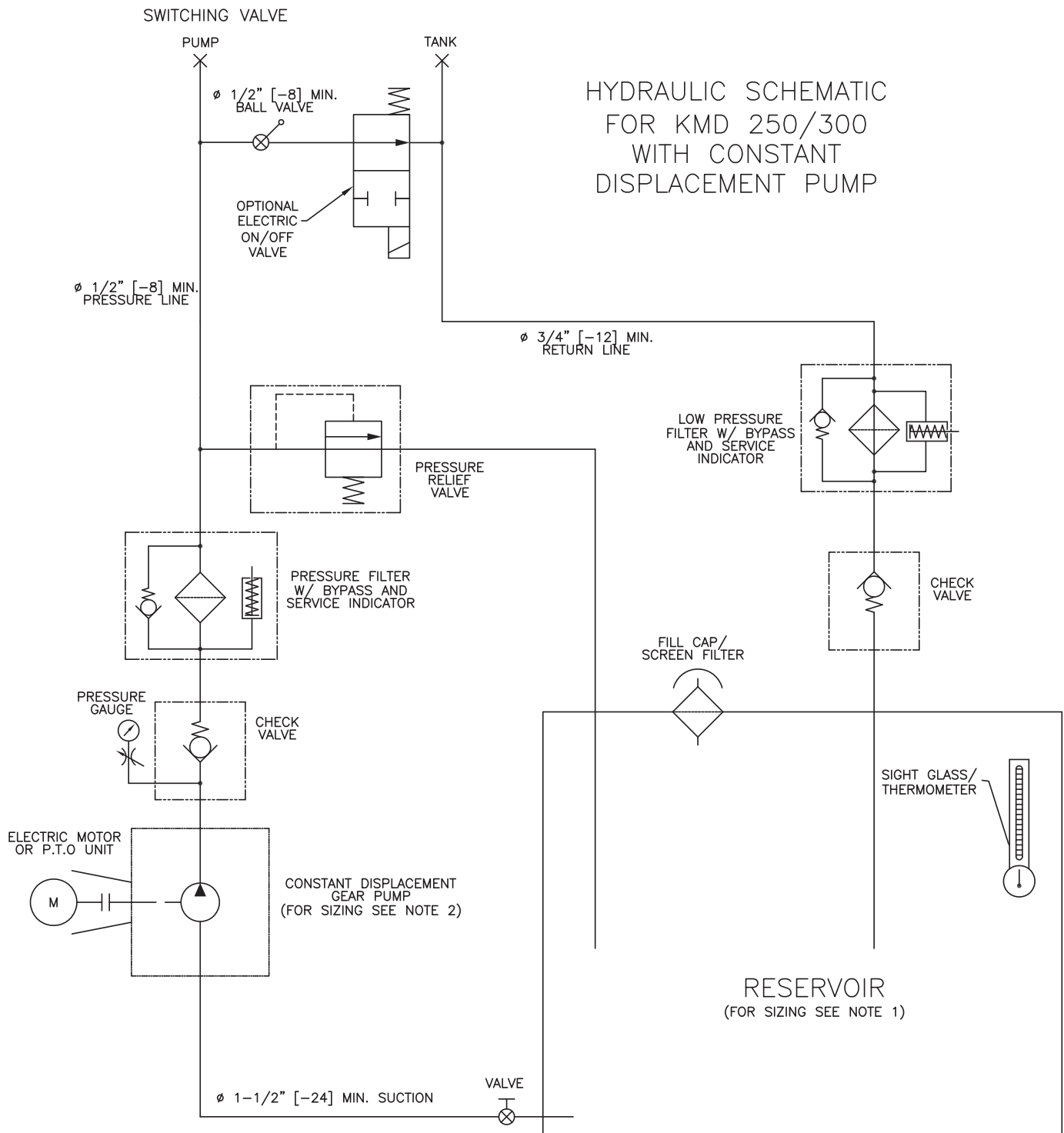


NOTES:

1- FOR MOBILE APPLICATIONS RESERVOIR CAPACITY MUST BE A MINIMUM OF 1 GALLON [1 LITER] OF FLUID FOR EVERY 1 GALLON [1 LITER] PER MINUTE SUPPLIED BY THE PUMP. (EXAMPLE: A 8 GPM [30.28 LPM] FLOW RATE NEEDS 8 GALLONS [30.28 LITER] OF FLUID WITHIN THE RESERVOIR.)

2- RECOMMENDED PUMP DISPLACEMENT FOR BOTH KMD 250 & 300 IS 5-6 GPM [18-22 LPM] WITH 8 GPM [30 LPM] MAX.

- Hydraulic Schematic with Constant Displacement Pump



NOTES:

1- FOR MOBILE APPLICATIONS RESERVOIR CAPACITY MUST BE A MINIMUM OF 1 GALLON [1 LITER] OF FLUID FOR EVERY 1 GALLON [1 LITER] PER MINUTE SUPPLIED BY THE PUMP. (EXAMPLE: A 8 GPM [30.28 LPM] FLOW RATE NEEDS 8 GALLONS [30.28 LITER] OF FLUID WITHIN THE RESERVOIR.)

2- RECOMMENDED PUMP DISPLACEMENT FOR BOTH KMD 250 & 300 IS 5-6 GPM [18-22 LPM] WITH 8 GPM [30 LPM] MAX.

8.0 Appendix 4 - Check List

Carefully check the items on this list. They are essential for optimal floor performance.

Before installation

- 1) The trailer should be straight.
- 2) The trailer should have cross bracing.
- 3) Cross-members should be level with other cross-members.

During installation

- 4) The 1" [25 mm] square tubing must be centered in the trailer.
- 5) The slide bearings should seat properly on the sub-deck and the flooring should seat properly on the bearings.
- 6) The drive unit must be properly aligned. a. The top of the drive shoes must be 1/4" [6.4 mm] higher than the top of the 1" [25 mm] square tubing. b. The drive shoes must align with respective 1" [25 mm] square tubes.
- 7) The cylinders must be entirely collapsed before drilling bolt holes through floor slats.
- 8) A slope shield on top and a guard under the front end should deny access to the stroke area so slats/planks cannot crush or shear anything entering that space.

After installation

- 9) The pressure and return lines should be connected to the correct switching valve ports.
- 10) Caution decals should be applied and visible.

Run the system following the instructions in the owner's manual.

After operation

- 11) Check for leaks and unnecessary rubbing.
- 12) Refer to the owner's manual and adjust the switching valve.

9.0 Appendix 5 - Torque Chart

Torque Chart			
Bolt	Location	Class	Torque ft-lbs [Nm]
M8 x 1.25	Switching Valve Actuator	8.8	18 [24]
-	Check Valve	-	18 [24]
M12 x 1.75	Flooring	12	110 [150]
M16 x 1.5	Cross Drive Clamp	10.9	110 [150]
M16 x 1.5	Drive End Plate	10.9	40 [55]
3/8" x 11/2"	Jig Hole Plugs	-	25 [32]

10.0 Appendix 6 - Bolt Requirements

