Hudson Bearings Air Cargo Ball Transfers

Installation and Maintenance Protocols

Air Cargo Ball Transfers Technical Overview:

Every air cargo ball transfer deck installation will have a unique set of challenges thus requiring engineered solutions that offer the best design. Hudson Bearings has been in business since 1969 and has been privy to a wide array of prominent air cargo projects worldwide. Hudson offers our technical expertise free of charge during the design and construction phase and commonly conducts site visitations. The technical information provided below combined with project checklist should serve as a guide in order to increase the life and utility of our ball transfers.

Overview General Protocols

- **Deck Levelness:** The deck must be level within 1/8th inch over 10 feet over the entire width and length of the area.
- **Spacing/Pitch (See more detailed explanation and Formula Below):** Standard spacing 8.”
- **Preventative Maintenance:**   Periodic flushing out of ball transfers with either air and or non-flammable fuel oil/WD-40 type oil may be recommended in order to clean units and extend unit life. If units are located where temperature is lower than 32 degrees Fahrenheit, a ULD with load capacity under 200 LBS. should be conveyed on a routine basis in order to prevent freezing of units.
- **Installation:** Ball transfers should sit flush on flange, holes accepting ball transfers need to have the correct tolerances, use of approved installation tool if use clips.
- **Max Temperature Ratings:** Vary from 250°F to 400°F based on the product selected.

30 Month Warranty: During planning stages buyer will complete a checklist that covers the general deck design, climate, spacing, dimensions and weight of ULD’s/Pallets, and deck levelness. If project conforms to our general protocols, Hudson will sign off on project and will replace any units “no questions asked” during the 30 month warranty term.

Spacing (pitch) between BTUs

Your Hudson Bearings ball transfer specialist will be able to tell you how many ball transfers you will need for your deck application. For most projects a safety factor resulting in 8" ball to ball spacing should be utilized. The benefits of closer spacing and a higher safety factor include enhanced ergonomics and ability to overcome ULD imperfections or other variables. Once a safety factor is established, the pitch can be calculated using dimensions of the product being conveyed, and the maximum weight conveyed.

Due to force of impact and number of balls in contact with ULD it is recommended that more ball transfers be placed in high traffic areas and entry points of the ball transfer deck.

Ball Spacing Formula

Note:

All dimensions are in inches and all weights are in lbs.

The width is to be taken as the shortest dimension of the article to be conveyed

1.) Use the equation below to establish how many ball transfers will be situated underneath the shortest side of the article to be conveyed.

$$Equation\ 1: \quad BTUs\ Along\ Width = \sqrt{\frac{\text{Max}\ Load * Safety\ Factor * Width}{BTU\ Load\ Capacity * Length}}$$

Note:

- Always round the result of Equation 1 to the next whole number. After rounding, add 0.5 (1/2) to the whole number as shown in equation 2. Using this number as the denominator of the next calculation ensures that there will always be a minimum of the initial whole number quantity underneath the width side of the article to be conveyed.

- If the result happens to be a whole number, there no need to round. Be certain to still add 0.5 (1/2) to the number calculated here.

2.) Calculation of Centerline Dimensions:

$$Equation\ 2:\quad Centerline = \frac{Width}{BTUs\ Along\ Width + \ 0.5}$$

3.) Total ball transfer units needed to cover a ball deck or table:

Note:

-In order to arrive at a total quantity needed for a ball deck or table, a proportion is set up. This proportion amounts to a known value of BTUs over a known area based on the size of the article. Setting this value equal to an unknown value of ball transfers needed over a known area, it is possible to arrive a total calculation.

Find total BTU's Under Article: $BTUs\ Along\ Length = \frac{Length}{Centerline}$

$$BTUs\ Along\ Width = \frac{Width}{Centerline}$$

Note: Make sure to round both values up to the nearest whole number prior to the next calculation.

$$Total\ BTUs\ Under\ Article = BTUs\ Along\ Length * BTUs\ Along\ Width$$

$$\frac{Total\ BTUs\ Under\ Article}{Surface\ Area\ of\ Article} = \frac{Total\ BTUs\ on\ Deck}{Total\ Surface\ Area\ of\ Deck}$$

$$Total\ BTUs\ on\ Deck\ \frac{Total\ Surface\ Area\ of\ Deck * Total\ BTUs\ Under\ Article}{Surface\ Area\ of\ Article}$$

Installation:

All Ball transfers should be on the flange flush to the deck. There are three ways these ball transfers can be installed. Drop in, pressed in, or installed with a clip that is designed to compensate for irregularities in bore and diameters

The hole sizes for each application are denoted below:

Application:	Drop In	Press Fit W/ Chamfered Hole	Press Fit w/ Clip
English :	1.842 +/- .005	1.768 +/- .001 Chamfer : 1/32	1.811 (+.01)/ (-.000)
Metric:	46.78 +/- .127	44.9 +/- .025 Chamfer: .794	46.00 (+.254)/(-.000)

Hudson Bearings LLC recommends that applications be designed for Drop in style mounting. However, if a tighter fit is desired or required, it is important that ball transfers are installed and pressed in with tools that do not damage the ball transfer during installation. Hudson is currently developing an installation tool.

Maximum Temperature Ranges:

HDBT 1 3/16 CS/SS YZ IR MW	250°F
HDBTM 1 3/16 CS/SS YZ IR MW	400°F
HDBT 1 3/16 CS/SS IR MW	400°F