

Package Lifting Guidelines

INTRODUCTION

The lifting of turbomachinery packages requires extreme caution and the use of suitable lifting equipment. This Product Information Letter provides some general guidelines to assist customers but it is not comprehensive. It is the responsibility of the party performing the package lift to use properly designed equipment and to observe adequate safety precautions.

OVERVIEW

The figures presented in this document depict the typical lifting arrangements used to lift turbomachinery packages with and without export crates. Other similar lifting arrangements may be used provided they prevent damage to the package enclosure or other package components. The length of the spreader bar/frame should be, at a minimum, as wide as the package being lifted (see Figures 1, 2 and 3).

It is imperative that all of the rigging components used are appropriately sized to handle the weight, configuration, and environment of the package being lifted. Details of the package, including package weight, center of gravity, overall package dimensions, and lifting point sizes and locations, are contained in the corresponding project's Mechanical Interface Drawing.

For single-point lifting arrangements, as shown in Figures 1 and 2, the sling lengths should be selected such that the crane hook is closely aligned with the package's center of gravity. This helps ensure a level lift. Also, to minimize the tension and to keep the lift stable, it is recommended that the lower sling angles for single-point lifts be kept between 60 degrees and 80 degrees from the horizontal as shown in Figure 4.

LIFTING ARRANGEMENT FOR PACKAGES IN EXPORT CRATES

The typical lifting arrangement for the package in an export crate is shown in Figure 1. Export crated packages are designed to be lifted using a basket hitch. Therefore, a sling must be placed under the crate to cradle the package during the lift as shown in the detail. The bottom of the export crate frame is notched, typically 3 ft (0.91 m) from the end of the crate, to help position this sling and prevent it from slipping inward as the package is lifted. Because the sling cradling the crate must be bent to a 90-degree angle, recommend using a synthetic fiber meshed sling. Wire rope slings can be used in a basket hitch configuration, but only one set of wire ropes per export crate can be used due to the permanent kinking of the wire rope around the base of the crate. This is unlike the synthetic slings, which will have one set for all export crate lifts.

LIFTING ARRANGEMENT FOR PACKAGES WITHOUT EXPORT CRATES

Figure 2 depicts a typical lifting arrangement used to lift the majority of packages when they are not in an export crate. If crane capacity is limited at the lifting site, splitting the package at the skid interface, removing a major component, or using two cranes may be required to lift the package. These types of lifting arrangements are considered non-standard and should be reviewed by engineering before they are performed. An example of a two-point lifting arrangement is shown in Figure 3. Note that the arrangement depicted in Figures 3 is for a package frame equipped with bollards. For a package frames equipped with gussets, the use of a two-point lift should be reviewed by Mechanical Analysis Group prior to

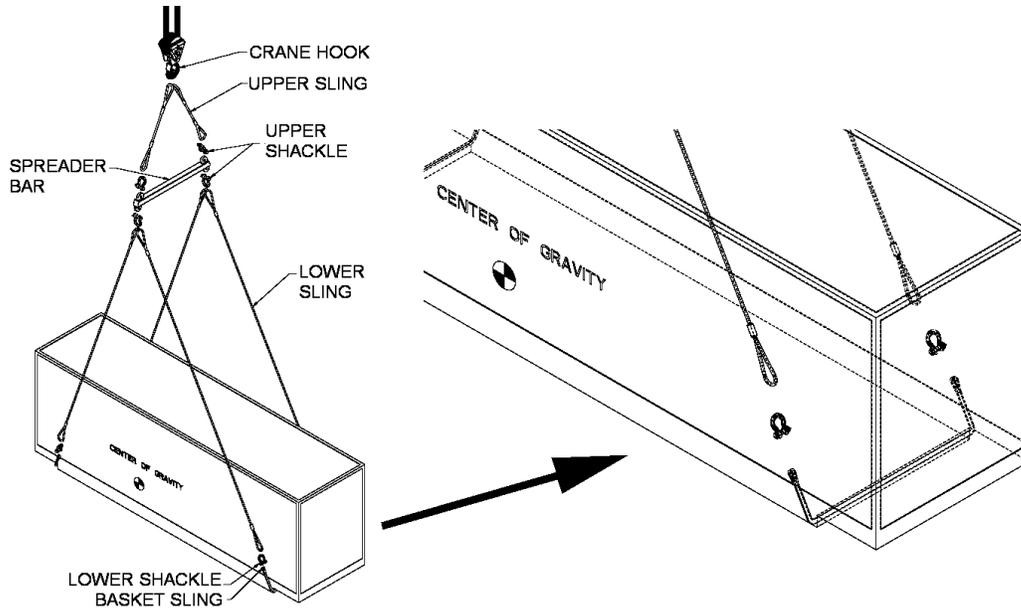


Figure 1. Typical Lifting Arrangement for Package in Export Crate with Details of Sling in Basket Hitch Arrangement

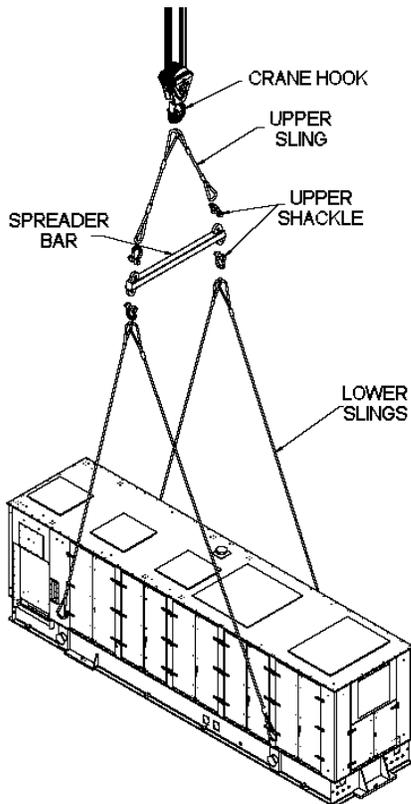


Figure 2. Typical Single-Point Lift

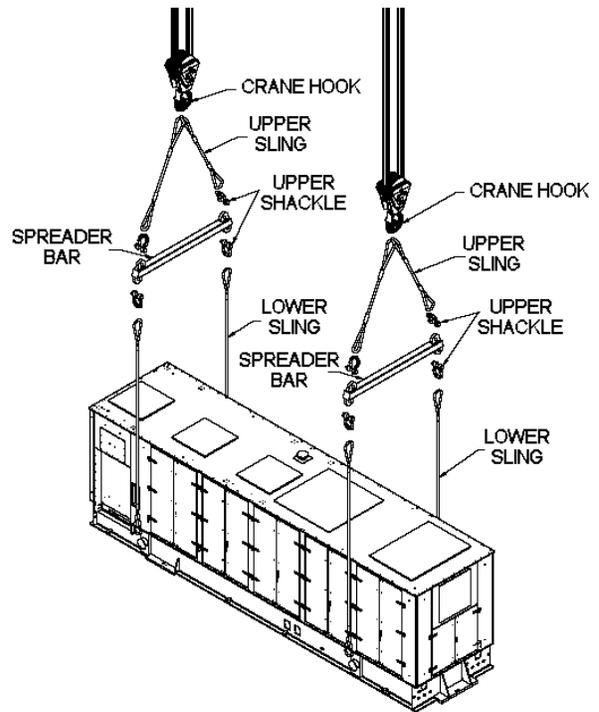


Figure 3. Two-Point Lift

LIFT POINTS

Each package frame is equipped with either bollards or gussets that are used to lift the package (see Figure 4, left and right).

- When lifting a package with bollards, the eye of the sling needs to be large enough to fit over the end cap of the bollard. The eye of the sling should make full contact with the underside of the bollard, fitting properly between the bollard end cap and the package frame.
- When lifting a package with gussets, an appropriately sized shackle fits through the sling eye and attaches to the lifting lug. These components should be sized so that the diameter of the attaching sling is less than or equal to the bow diameter of the shackle. If a binding condition on the shackle is present, the shackle capacity must be de-rated appropriately based on the binding angle.

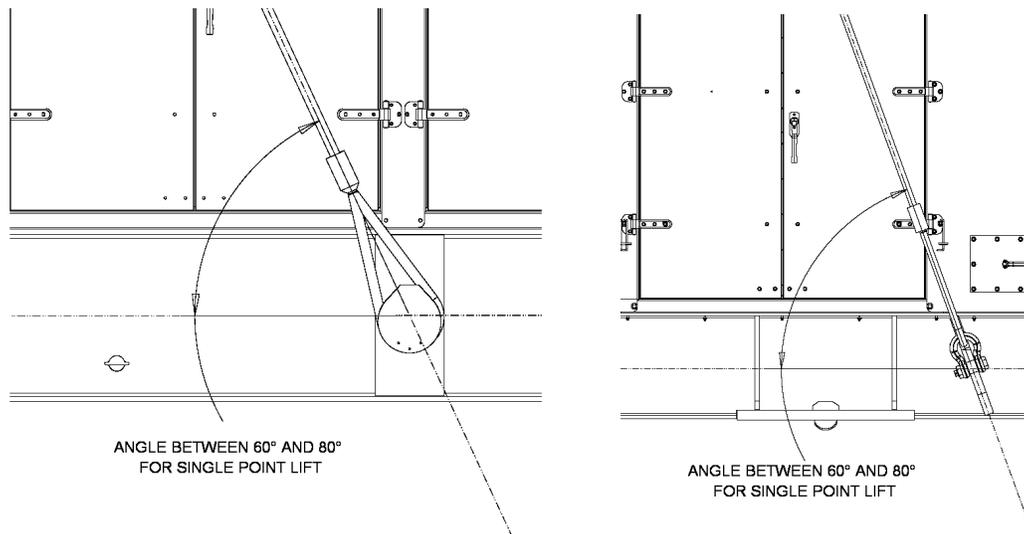


Figure 4. Lift Details for Package with Bollards (left) and with Gussets (right)

