CONVEYOR COMPONENTS: Baldor•Dodge ISAF HYD & ISNX Bearings for Conveyor Pulleys

CO Engineering Conveyor Components
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Baldor•Dodge has a bearing product, ISAF HYD & ISNX that provides a modern innovative bearing design for those demanding applications in the Mining and Aggregate industries. The bearing of choice historically used on conveyor pulleys has been the SAF style mounted bearing series (Baldor•Dodge USAF or SAF bearings). The reason these bearings were used is that they had been the only bearing type available for all shaft size ranges from 5" through 20". The SAF style bearing assembly utilizes a double row spherical roller bearing with tapered adapter mounting to the shaft that is placed in a two piece pillow block housings made from gray cast iron material. The pillow block housing is designed to accommodate labyrinth seals that rotate with the shaft to provide sealing. This bearing must be assembled on site. Now, Baldor•Dodge has a bearing product that will become the new 'norm' in those demanding applications. The ISAF HYD & ISNX bearing has the following standard features that are built into the product design to provide superior performance beyond that of the SAF style bearing:

a) Unitized bearing insert
b) Patented hydraulic assisted mounting and dismounting system
c) Auxiliary / taconite duty seals with triple lip internal sealing
d) Ductile iron housings
e) Equivalent load ratings and dimensional features as "standard" SAF bearings
f) Wide range covering shaft sizes from 5 7/16" to 15"

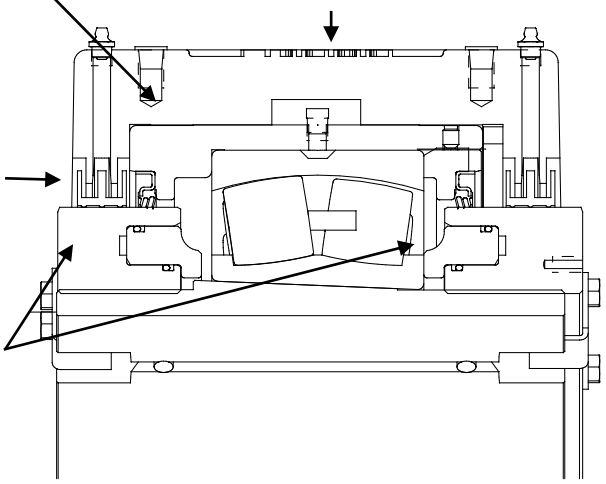
Shown on the next page is the cross sectional view of the Baldor•Dodge ISAF HYD & ISNX bearing:

a) Unitized insert with double roller spherical bearing, patented adapter mounting system, triple lip seal and anti-rotation pin

c) Taconite duty seals – repurgeable labyrinth with internal triple lip seal in the bearing insert

b) Patented mounting & dismounting nuts with hydraulically activated pistons to attach and release bearing to the shaft

d) Ductile iron pillow block housing with built in Taconite seal lubrication ports & fittings.



SAF style bearing are not preassembled. The bearing components are shipped in separate boxes requiring a difficult process for the installer to mount the bearing to the conveyor shaft. The installation process requires that the bearing internal clearance be measured with feeler gauges before and during the installation process to ensure that the proper clamping force is obtained to ensure proper attachment to the shaft. The locking nut is rotated on the tapered adapter sleeve to draw the adapter into the bearing bore locking it to the shaft. This process requires sufficient force to be applied to the locking nut to achieve the required clamping and is accomplished by use of spanner wrenches, bars, hammers, drive pins, etc. Use of hydraulic nuts can simplify this process but does require purchasing a costly hydraulically assisted locknut that would be used solely for installation purposes. One major concern during installation is that bearing components can be contaminated that shorten the bearing life. The bearing is not sealed allowing dirt, water or other contaminants to get into it. The seals are separate items and must be positioned in the housing after mounting the bearing to the shaft. The adapter system only mounts the bearing as there are no provisions for dismounting the unit from the shaft.

The Baldor•Dodge ISAF HYD & ISNX uses a one piece sealed insert that contains the double roll spherical bearing, and the patented adapter mounting / dismounting system utilizing hydraulic fluid to activate the pistons to both install and remove the bearing from the shaft. The procedure used to accurately mount & **dismount** the unit does require the use of a portable hydraulic pump and dial indicator. This procedure uses mechanical power rather than human effect that reduces the assembly time required dramatically. Since the insert is totally sealed the unit can't be contaminated during the installation process. Another built in feature is the use of an anti-rotation pin that prevents the insert from creeping or rotating in the housing.

Which would you rather install on a conveyor pulley shaft?

SAF style roller bearing as assembler would receive the bearing after removing the parts from the boxes. Bearing contains:

Housing – cap, base & hardware

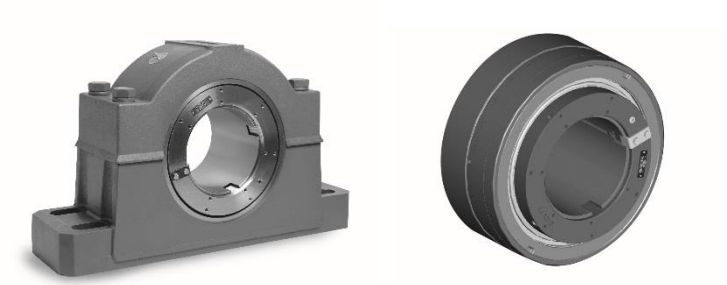
Bearing component

Adapter sleeve

Lock nut and washer

Baldor•Dodge ISAF HYD / ISNX

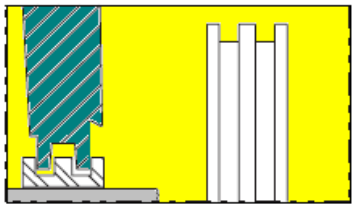
Installer would receive the assembled bearing. Installer would loosen & remove bolts in housing and remove the bearing insert (picture on far right & the seal (not shown)



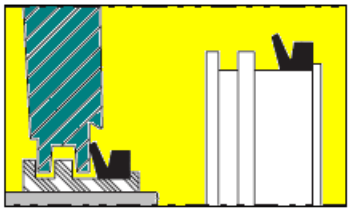
SAF style bearings are normally supplied with a labyrinth non- contact seal. Contaminants from the environment are kept out of the bearing by use of grease that fills the grooves between the seal and housing. The bearings must be 100% filled in order to have effective sealing. Baldor•Dodge provides Triple Tech seals on their SAF style bearings that improve this standard seal by incorporating a V-ring seal that provides a contact sealing surface between the seal face and housing in addition to the labyrinth. The Triple Tech seal provides an excellent sealing surface to keep contamination out of the seal grooves and ultimately the bearing elements themselves. However, over the years another seal type was developed for applications for the processing of taconite iron pellets and referred to as “taconite duty” seals. They were designed to keep fine abrasive particles from contaminating the bearing components. The seal design utilizes three separate elements: 1) an inner seal to keep the lubricant in the bearing, 2) an outer seal that would keep contaminates from getting into the bearing, and 3) a grease chamber that separates the two seals and trap any contaminants that may have entered through the outer seal. The fundamental design principle was having separate grease chambers, one internal to lubricate in the bearing, and a second outer chamber built into the seal. The outer grease chamber would be re-lubricated frequently to purge out any contamination. This type of seal is used in applications that produces any fine abrasive material, such as any processing that involves mining of any minerals (coal, copper, lime, potash, etc) or aggregates (rock quarry, granite, etc). Manufacturers have designed these “taconite seals” or auxiliary seals to fit into standard housing by placing a rubber O-ring between the outer surfaces of the seal and clamping it in the seal grooves of the housing. The clamping of the rubber provides a positive seal to prevent any wear or allow contamination to get into the bearing from the environment. However the use of this seal makes the length of the bearing assembly longer, and its use must be

accounted for in the pulley shaft design. The increase width of the bearing assembly can cause an increase in the bearing center locations which in turn can affect both the required shaft size and end disc in the pulley. Farther apart the bearings are from the pulley would result in an increase in shaft deflection that would affect the load carrying capacity and the design of the end disc in the pulley.

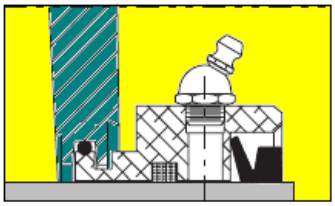
The Baldor•Dodge ISAF HYD & ISNX bearing incorporates "taconite duty" seals as a standard design feature. The bearing insert has built in triple lip seals providing a positive contact seal keeping the lubricant that lubricates the bearing contaminant free. The housing also has the "normal" labyrinth style seal that is repurageable to keep contamination out of the bearing. The length of the bearing assembly has been designed to be equivalent to the SAF style unit, therefore one can use this "taconite duty" sealed bearing without increasing bearing centers. You can now change out the SAF style bearing with the Baldor•Dodge ISAF HYD & ISNX bearing with no installation modification required. Shown here are the different seal styles, installed in the SAF housing:



LER SEAL



TRIPLE-TECT Seal



AUXILIARY TACONITE Seal

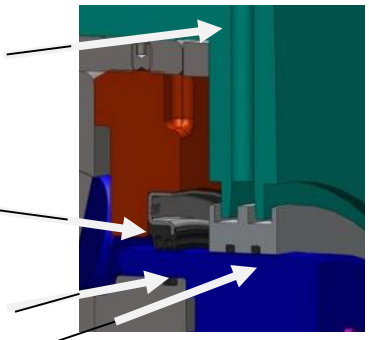
Shown here is a cross sectional of the seal area in Baldor•Dodge ISAF HYD & ISNX bearing.

Grease passage to relubricate the outer labyrinth seal

Triple lip seal in the bearing insert

O-rings in outer seal to ensure seal rotates with shaft

Outer labyrinth seal



The Baldor•Dodge ISAF HYD & ISNX bearing insert is factory lubricated and ready for operation after being installed. The seals in the housing will only need to be lubricated. Whereas a SAF style bearing the installer would need to lubricate the bearing during the installation process. On an 8" SAF bearing, it would require 25 lbs of grease; the quantity of lubricant required has would be only 2 lbs to lubricate the seals. The amount of lubricant required when re-lubricating would be reduced as the lubricant only needs to lubricate the bearing and not replenish the lubricant in the housing cavity. The issue of bearing contamination during installation has also been eliminated.

The pillow block housing used on SAF style bearing is manufactured with gray cast iron grade 25 (25,000 PSI tensile strength). Some applications require housing with additional load carrying capacity to match the tensions from the belt conveyor. These applications require the use of either ductile or cast steel. The Baldor•Dodge ISAF HYD & ISNX bearing housing is designed with ductile iron (65,000 PSI tensile strength) providing a stronger housing for those tough applications. The housings were designed to be dimensionally interchangeable with the standard industry SAF series.

One can see why the Baldor•Dodge ISAF HYD & ISNX will become the new norm for bearings requirements in these industries. These bearings were designed to overcome the problems that occur daily due to sealing, installation and cost that occur due to shaft and pulley designs to accommodate 'taconite seals' The same double row spherical roller bearing series is used in the Baldor•Dodge ISAF HYD & ISNX series as the SAF style unit so they would have the same dynamic load ratings removing any concern that the bearing will be undersized. The housings are dimensionally interchangeable so you can now have "taconite duty" seals where you could only have installed less effective labyrinth seals. This shows why Baldor•Dodge is a leader with innovative bearing designs and specified for those tough demanding applications.