

# Aerospace Bearings



## Introduction

**Smith Aircraft Bearings** presented in this section have been designed to meet the standards of the aerospace industry and conform to military and other appropriate national standards. When selecting these bearings for your application, it is recommended that you review the engineering data provided, along with any appropriate military or national specifications.

**Smith Bearing®** has been a leader in the design and manufacture of specialized bearings for the unique requirements of jet engines. We have kept pace with the ever increasing demands for anti-friction bearings to operate at higher temperatures. Thrust reversers, afterburners, and divergent nozzles are some of the areas in which **Smith Bearing®** Bearings are currently functioning. Contact our engineering department for recommendations and design assistance.

## Military Qualifications

The products listed meet the military requirements of **Mil-B-3990 (SAE AS 39901)**

**Smith Aircraft Bearings** are marked with the bearing designation including bearing type code. Many of these bearings are supplied pre-lubricated to meet the OEM's special requirements. When ordering, attention must be paid to the original manufacturers parts list requirements so that proper identification can be provided.

## Federal Aviation Administration Parts Manufacturing Approval FAA PMA

Smith manufactures bearings to meet the provisions of the Federal Aviation Regulations (**FAR**) for Parts Manufacturing Approval (**PMA**).

**Smith Bearing®** maintains an active list identifying all of our **FAA PMA** parts and where they are applicable. This list is available upon request.

## Bearing Selection

### YAF (MS21438) & YAT (MS21439)

**YAF** and **YAT** Series Yoke Type bearings have heavy outer ring sections and were designed for application as track rollers where the bearing O.D. is unsupported. These bearings will support heavy rolling or oscillating loads in cam or track roller applications. The **YAF-Series (single row)** needle bearings have a crowned outer race. The **YAT-Series (double row)** needle bearings have large blended outside corner radiuses to help distribute stresses. The outer race is hard-chrome plated and all other exposed surfaces are cadmium plated for corrosion protection. These bearings can be re-lubricated thru the inner ring bore. When mounting, care should be taken to properly support the end plates to eliminate the possibility of bearing separation due to thrust loads. These bearings are dimensionally interchangeable with the corresponding **YAD** and **YAS** Series.

### YAD (MS24465) & YAS (MS24466)

**YAD** and **YAS** Series Yoke Type bearings are dimensionally similar to the **YAF** and **YAT** Series. These bearings were designed for track roller applications where the outer race of the bearing is unsupported. They will handle heavy rolling or oscillating motion. The outer race is hard-chrome plated and all other exposed surfaces are cadmium plated for corrosion protection. The bearing is held together using a swedged ring inserted around the inside of the end washers. These bearings are generally considered for replacement in existing applications. For new applications and current designs use the **YAF** and **YAT** Series.

### YAG (MS24461)

**YAG** Series Yoke Type bearings were designed for applications where the bearing is mounted inside the housing. These bearings handle slow rotating or oscillating motions. All external surfaces except the bore are cadmium plated for corrosion protection. The bearing is held together using a swedged ring inserted around the inside of the end washer.

### HRS (MS21432) & CHRS (MS21447)

**HRS** and **CHRS** Series Stud Type bearings are of non-separable construction and are used in applications involving high-static loads or oscillating motion. The **HRS-Series - straight cylindrical outer race** and the **CHRS-Series - crowned outer race** were designed for airframe usage in flap tracks, canopies, and landing gear. When misalignment is a concern, the **CHRS (crowned)** Series is preferred. The outer races are hard-chrome plated and all other exposed surfaces are cadmium plated for corrosion protection.

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## Load Ratings

### Aircraft Static Capacity (ASC)

is the maximum load which can be placed on a housing mounted needle roller bearing without seriously brinelling the raceways (approx. 0.0001 inch deep) or deforming the rolling elements.

### Limit Load Rating

is the maximum static load that can be applied without impairing the subsequent function of the bearing.

### Ultimate Static Fracture Load Rating

is a minimum of 1.5 times the Limit Load Rating

## Track Roller Bearings

**YAF, YAT, YAD, and YAS** Series bearings are designed for use as a Track Roller and therefore operate with an unsupported outer race. For this reason deformation of the outer race must be taken into consideration. The dynamic rating method used for track roller bearings is the **Rating as a Track Roller** which equals 1/3 **ASC** (Aircraft Static Capacity). The **Limit Load Rating** for track roller bearings equals 4/9 **ASC** (Aircraft Static Capacity).

**HRS** and **CHRS** Series bearings with integral stud are designed for use as a track roller. For these bearings the **Limit Load Rating** equals 2/3 **ASC** (Aircraft Static Capacity).

## Housing Mounted Bearings:

**YAG** Series bearings must be mounted inside a housing and are not used as a track roller. For these types of bearings the **Ultimate Load Rating** is equal to the **ASC** (Aircraft Static Capacity). The **Limit Load Rating** equals 2/3 **ASC** (Aircraft Static Capacity).

## Temperature

Unsealed aircraft bearings can be operated at temperatures up to 400 °F provided that suitable lubrication is present. Higher temperature exposure will result in loss of capacity. The operating temperature for sealed bearings is limited to 250 °F due to the seal material.

## Stainless Steel

**Smith Bearing®** produces Stainless Steel airframe bearings which are dimensionally interchangeable to our standard line of bearings listed in this section. The special grade of stainless steel used has extremely high strength and corrosion resistance. Material used is per AMS 5925 or AMS 5898 for inner races, outer races, studs and rolls and AMS 5621 for end washers. Consult our engineering department for exact specifications and applications.

## Smith Aircraft & Military Bearings

SMITH Bearing® Model	Description	Military Standard	SAE Standard	ABMA Number	NAS Standard
<b>YAF</b>	Yoke Type • Single Row • Track Roller	MS21438	AS21438	N/A	N/A
<b>YAT</b>	Yoke Type • Double Row • Track Roller	MS21439	AS21439	N/A	N/A
<b>YAD</b>	Yoke Type • Single Row • Track Roller	MS24465	AS24465	NBF	NAS 502
<b>YAS</b>	Yoke Type • Double Row • Track Roller	MS24466	AS24466	NBL	NAS 503
<b>YAG</b>	Yoke Type • Housing Mounted	MS24461	AS24461	NBC	NAS 505
<b>HRS</b>	Stud Type • Track Roller	MS21432	AS21432	HRS	NAS 562
<b>CHRS</b>	Stud Type • Crowned • Track Roller	MS21447	AS21447	CHRS	N/A

