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Bearing specificaitons ensure reliability

The "best-of-competition" plants in the processing industry use definitive component specificaitons whenever reliability engineering concepts are acticely pursued. They somhow realize that buying on price alone is rather naive and that a better product will have to commanda better price price.

A Dutch refinery with 11,000 pumps amends API 610 by asking that:

- All rolling elements shall have metal rolling element retainers.
- Parallel roller bearings are preferred as pure radial bearings.

Table 1. Machinery component specification

Radial and angular contact ball bearings

1.0 Scope

1.1 This specification covers the mandatory requirements for
1.2 radial and agular contact ball bearings used in general purpose process machinery.

1.2 Bearings shall comply with the specification requirments of the AFBMA for ball bearings. Bearing dimensional tolerances shall meet or surpass the tolerances defined by ABEC Class 1.

1.3 All bearings suplied per this specificaiton shall be obtained directly from the identified bearing manufacturer or authorized distributor.

1.4 The bearings shall be packaged per AFBMA Standards, Section 6. The bearing box shall be marked to identify the original bearing manufacturuer and the alphanumeric bearing identificaiton doce or designation system.

2.0 Ball bearing design

2.1 Radial and agular ball bearins shall have the following design and features:

Bearing type	ABEC clearances	Ball retainer	Other features	Accipetable manufactueres
Single row, deep groove ball bearings	C-3	Riveted steel	Conrad type, no filling slot allowed	SKF/MRC, FAG Torrington/ Fafnir, NSK, KTN KOYO
Double Row, deep groove ball bearing	C-3	Stamped steel	No filling slot allowed	SKF/MRC,NTN, Torrington/ Fafnir, KOYO
40° angular contact, ball bearing	Standard	Machined bronze	Land riding, if available; duplex mountable, *nil prel.*	SKF/MRC, FAG Torrington/ Fafnir, KOYO, Rollway

2.2 Bearing shields, seals, snap rings, etc., shall have the configuration specified by purchaser's applicable spare parts symbol number or specified description for the stipulated applicaiton.

2.3 No substitutions are allowed for the bearing manufacturers of the bearing reatures shown without the approval of the purchaser's rotating equipment reliablilty engineer.

- Roller bearings shall have the roller retaining rim on the inner race.
- Shielded or sealed bearints shall not be used, except for vertical in-line pumps up to 22 kW.

A major refinery in Texas tacks a machinery component parts specification to both inquiry and purchase documents (Table 1).

When the API 610 Seventh Edition became available in February of 1989, we advised a large-scale user of centrifugal pump bearings to consider replacing paragraph 2.9.1.5 with the replacement wording shown in Table 2.

Tkae your pick, or combine elements of the various specidficaiton amendments into a document that suits your particluar needs. SeeK out the world's leading manufacturers of rolling element bearings and ask them if they have a business team, or application engineering group dedicated to fluid machinery. Get their advice, request their relevant lieterature–you may be pleasantly surprised to see the value of sound, experience-based recommendations. But don't expect to get better bearings, or any other precision compnents, without making an effort to assemboe a pertinent specification document. Remember: "no pain, no gain." ■

Table 2. Replacement wording proposed for API-610 7th Edition, paragraph 2.9.1.5

Specificaiton amendment for heavy-duty centrifugal pumps

(This S.A. is appropriate for attachment to inquiry or purchase document.)

2.9 Bearings and bearing housings

2.9.1 Bearings for horizontal pumps

2.9.1.5 (Exception)
a. If balll-type thrust bearings are used, the vendor shall verify the adequacy of duplex, single-row, 40° (0.7 radian) angular-contact type (7000 series) bearings, installed back-to back (DB). This verificaiton shall include selection of proper preload values to prevent skidding of the unloaded bearing over the entire operating range of the pump.

b. If a., above, points to inadequacies or potential problems, the vendor sall offer suitably perloaded sets of ball-type thrust bearings with dissinliar contact angles (e.g., 40°/15°).

c. Sets of properly preloaded, back-to-back mounted 15° or 29° angular contact bearings are acceptable for pumps with double-flow impellers located between two bearing housings.

d. In each case, the need for and extent of preload shall be determined by the vendor to suit the application and meet the bearing life requitrements of 2.9.1.1.

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