



STAINLESS STEEL CASTINGS
NICKEL STEEL ALLOYS
CENTRICAST AND MECHANICAL TUBES

CENTRICAST BALLS AND SEATS FOR BALL VALVES

Our Company is producing since 30 years through centrifugation technology balls and seats mostly for oil and gas applications. Balls are normally produced via vertical centrifugation in shaped moulds, seats can be produced either through cutting of long horizontal centricast pipes or shorter verticast rings. Total production in 30 years can be estimated in about 10.000 tons of balls and 2.000 tons of pipes for seats.

Dimensional range

In vertical centrifugation we can produce balls in shaped moulds up to 32" nominal size, in general for rings or whatever other geometry 1400mm max OD, 1250mm max length, 4000 Kgs max weight. Also high pressure rating balls (with trunnions exceeding the spherical shape) can be produced, through dedicated moulds.

In horizontal centrifugation pipes up to 1200mm OD, 1150mm Id, 4700mm length can be produced.

All moulds are generally property of the foundry, so we don't charge them to customers, if not obliged by special shapes.



Alloys

All alloys (martensitic, austenitic, duplex, superduplex, superaustenitic, nickel base), normally cast in valve business, are producible. More details on individual alloys can be found on our web www.fondinox.com. For all requested alloys a full official Norsok qualification is available acc. to Statoil TR2000); in details at present we are qualified for:

- A995 4 A duplex: up to 100mm wall for pipes and up to 200mm wall for balls

- A995 5 A superduplex: up to 100mm for pipes and 200mm for balls
- A351 CK3MCuC (6%Mo): up to 100mm for pipes and 200mm for balls
- A494 CW6MC (Alloy 625): up to 120mm for pipes and up to 200mm for balls

A lot of different qualifications are also existing issued by all major oil and gas world Companies or Engineerings, qualifying us for their projects.

Execution phases

Melting, centricast and heat treatments are completely done in our foundry. Balls can be supplied as raw unmachined parts, premachined, or finish machined and grinded conditions (last operations are done in qualified specialized mills for ball machining). Seats are normally supplied as full or cut pipes, in raw or premachined condition, leaving their finishing to dedicated subsuppliers.



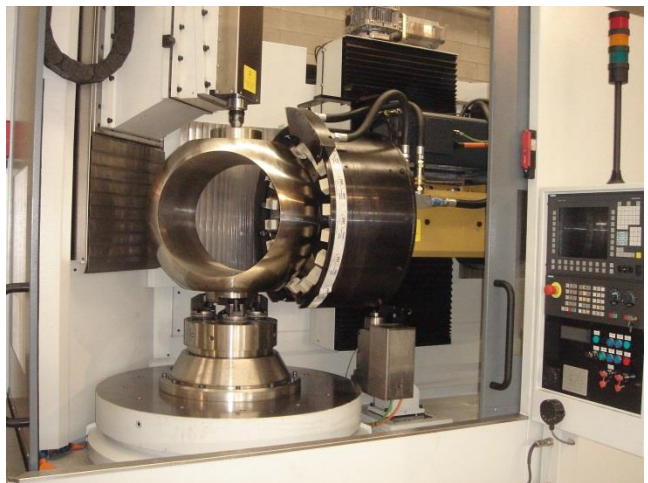
Material quality

We have done a lot of research on the real properties of centricast balls and seats, compared with usual hot forging production technology. From a metallurgical viewpoint there is substantial equivalence of properties for most alloys. Advantage of forging material is the finer grain size for most alloys (excluding duplex and superduplex families) where they are equivalent to cantricast products. Main advantage of centricast technology is the fact, that the centrifugation process, where rotation is giving to solidifying material a centrifugation effect of about 50/70g in vertical process, confers to our products an optimal metallurgical cleanliness, at same molten alloy starting quality, due to the heavy separation of light particles from basic metal during rotation, pushing them to the inside bore, where a simple turning operation can eliminate completely such inclusions. Cleanliness means better corrosion resistance. Other advantages towards forgings are:

- Possibility to produce limited heats with special customized compositions (hot forgings are bounded with big steel mill heat sizes)
- Possibility to obtain in austenitic alloys special compositions with 50% increase in yield stress, through contemporary additions of nitrogen and a different phase balance (a patent was obtained

for such alloys, named 316HP and 316LHP), what is particularly requested in cryogenic environments (high impact), where high resistance is also requested

- A very fast process (pouring, centricast solidification, heat treatment, machining) allowing short lead times not achievable through different production technologies



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