

# CONDENSER TUBE CLEANING SYSTEM (CTCS)



## PURPOSE

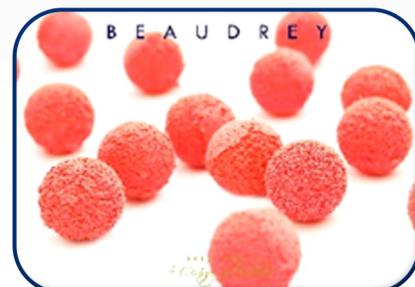
- ◆ This is a sponge-ball type tube-cleaning system
- ◆ In spite of upstream screens and strainers:
  - ◇ Dissolved chemicals precipitate and build into scale on the tube surface
  - ◇ Biological elements settle and grow on the tube surface
  - ◇ Fine mineral particles deposit on the low-velocity boundary and combine with the biological growth
- ◆ As a result, the heat transfer by the tubes is much reduced and the plant's loss of generation can be 3% or more
- ◆ Fitting a BEAUDREY CTCS eliminates the above problems. The system is used in all plants with tubular exchangers and condensers

## DESCRIPTION

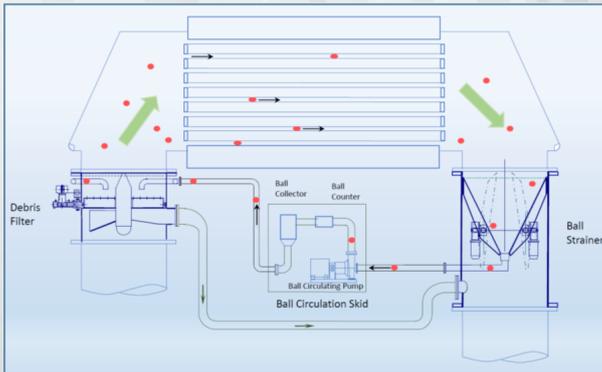
- ◆ The ball-laden water enters the cylindrical spool piece where two angled grids with bars spaced a few millimeters, arrest the balls as the flow passes through.
- ◆ The balls roll along the grids to the downstream extremities where they are collected in whirl boxes and exit to the skid-mounted ball pump and ball collector. The optional ball counter and spent ball remover are also skid mounted.
- ◆ When in circulation, the balls travel back to the upstream side of the condenser where they are injected into the incoming cooling water. As the size of the balls is slightly larger than the diameter of the tubes, they squeeze into the tubes, pushed by the condenser head-loss. The balls sweep the tubes clean before exiting from the condenser towards the ball catcher.
- ◆ When debris build up on the grids, the head-loss increases. As it reaches a preset value, the balls are collected and the grids are tilted by their actuators to an opposite angled position. The water then backwashes the debris away. The grids resume their normal position and the balls are back in circulation.

## ADVANTAGES

- ◆ Economical system
- ◆ Proven and reliable (hundreds in service)
- ◆ Eliminates periodical shut-downs for manual tube-cleaning
- ◆ Eliminates periodical chemical cleaning
- ◆ Increases the generated power which results in a short pay-back time (often less than 18 months)
- ◆ Extends condenser tube life



## TYPICAL LAYOUT



Typical PID representation of a condenser installation with Debris Filter and CTCS



## ANCILLARIES AND OPTIONS

- ◆ Ancillaries
  - ◇ Differential pressure sensor
  - ◇ Electrical control cabinet
- ◆ Optional features
  - ◇ Inspection Manhole
  - ◇ Undersize Ball sorter
  - ◇ Ball counter



## MATERIALS

- ◆ Panel frame: painted carbon steel for fresh-water applications, stainless steel for seawater applications
- ◆ Wall guides: AISI 304L for fresh-water applications, AISI 316L or duplex stainless steel for seawater applications
- ◆ Mesh: in all cases, stainless steel or composite materials

## SIZES AND DATA

- ◆ Standard sizes from DN500 (12") to DN3200 (128"). Larger machines and special shell dimensions on special order
- ◆ Head-loss about  $1.5 V^2/2g$  in most cases, "V" being the inlet velocity in the spool piece
- ◆ Ball strainers are designed and manufactured in accordance with international standards:
  - ◇ ISO DIN
  - ◇ ASME AWWA



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