



INTERNAL CORRESPONDENCE

UC 149-2

Jim - Have these recommendations been
implemented?
Or not, please then be?

BN

CHEMICALS AND PLASTICS

P. O. BOX 471, TEXAS CITY, TEXAS 77590

TO (NAME) ② R. L. Frantz
COMPANY
LOCATION Texas City Plant

DATE January 24, 1977

COPY TO J. P. Alexander
Z. M. Cartwright
J. T. Floyd
F. S. Provenzano
① J. R. Rex

SUBJECT Rupture Disk Failures

As a result of your request to study the possibility of premature rupture disk bursting resulting from improper installation, an investigation was initiated and the results are as follows:

Per Jim Rex, the problem of rupture disks bursting below rated pressure seems to be a problem confined to suspension autoclaves (especially the south line) and stripping tanks.

Stainless steel reverse buckling disks (one-3" and one 4") are installed on suspension autoclaves and single component, stainless steel prebulged rupture disks (two-3") on stripping tanks.

A detailed set of step-by-step installation instructions accompanies each box of new rupture disks. Information necessary for satisfactory operation of the rupture disk is contained in this instruction sheet.

During installation the tightening of cap screws and studs to a specified torque is critical to correct operation of the RB-90 type rupture disk. No specified torque is given for the prebulged type rupture disk.

Specifications for the torquing of the RB-90 type is contained in the installation instructions. No torque data is given for single component, prebulged type rupture disks.

Notably, it is common practice not to torque rupture disk assemblies during installation. For two reasons this is not practical on the suspension autoclaves. First, these vessels are glass lined, recommended torque would probably damage the glass lining. Second, a soft composite teflon gasket is used between autoclave flange and rupture disk assembly. Over a period of time a compression set would occur and bolt torquing would be lost.

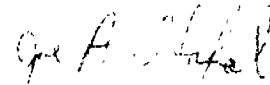
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Rupture Disk Failures, cond.

In light of the above I make the following recommendations to insure proper operation of autoclave and stripper tank rupture disks:

1. Have maintenance supervisor review installation instructions with pipefitters.
2. Purchase a different type of safety head for autoclave rupture disks. That is, install full diameter, flat-faced safety heads (cost \$130. for 4" size) in the place of reduced diameter flat-faced safety heads. The former would allow the assembly to be correctly torqued before installation via built in cap screws, the latter relies on the studs holding the assembly to vessel flange for clamping force.
3. Purchase RB-90 type rupture disks for stripping tanks. Although costing more, they offer the following advantages outlined on attached vendor literature.
4. Insure that all RB-90 type rupture disks are initially torqued to specifications and when possible checked that the proper torque is maintained. Note that torquing of assembly should never be done while rupture disk is exposed to pressure.

Sincerely,



J. A. Otahal

RB-90[®] Provides Optimum Safety Head Protection Against Overpressure

1 Closer margin between system design and operating pressure.

RB-90's enable systems to be operated at pressures up to 90% of the maximum allowable working pressure (rated pressure of the disk)...as compared to a maximum of 70 to 80% for solid metal and composite disks.

Increases product output... improves product quality.

Existing equipment can now be operated closer to its maximum allowable working pressure (MAWP). Reaction vessels operating at higher pressures can decrease reaction time and increase product output. Higher operating pressure may also improve product quality.

Cuts costs of new systems.

With the use of RB-90's, vessels can be designed with thinner walls. Only a 10% margin is needed between system operating pressure and the reversal pressure of an RB-90 disk. This means the design pressure of a vessel, protected by the RB-90, can be closer to its operating pressure than one protected by relief devices requiring a 20 to 30% margin.

2 Higher disk performance accuracy.

RB-90's are accurate within $\pm 2\%$ of their rated pressure and temperature at 100 psi and above. Below 100 psi, they are accurate within ± 2 psi. Manufacturing range eliminated. Disk is stamped for exact pressure and temperature specified.

Extends the range of Safety Head applications.

RB-90's expand the application of non-mechanical pressure relief devices to critical processes requiring closer tolerances than other disk designs can provide...processes requiring a highly accurate point of over-pressure relief.

3 Longer service life.

RB-90's last ten or more times longer than conventional prebulged disks in static or positive pressure cycles...100 or more times longer in pressure-vacuum cycling service.

Less affected by fatigue and creep.

RB-90 disks are installed with the convex side toward the process and have compression loading. Conventional disks are installed with the concave side toward the process and are under tension loading. Disk metals under compression are much less affected by fatigue and creep.

No vacuum supports required.

RB-90 disks are installed with the convex side toward system vacuum. Disk metals are thicker than those used in conventional solid disks of the same size and pressure rating. So vacuum supports are not required. During pressure and vacuum cycling there is little disk movement to weaken disk metal. And the RB-90 disk can withstand high back pressure without damage. A conventional disk with vacuum support has a movement during pressure and vacuum cycling. This ultimately weakens the disk and shortens its life.

Product buildup is reduced.

RB-90 disks resist product buildup. Only the smooth convex side is exposed to system contents. The vacuum support under a conventional disk has an irregular surface which tends to allow a much faster product buildup. The use of RB-90's therefore cuts maintenance costs by greatly extending the length of time between Safety Head disassemblies.

4 No fragmentation.

RB-90's have four razor sharp blades that cut the disk into four equal segments. No process contamination by metal. No damage to instrumentation.

Avoid Oral Instruction

Date 3-4-77

To Bob:

- 1) Zach Cartwright has discussed the with
his pipelitters.
- 2) Have been installed on 3 & 4 stripping tanks.
- 3) Do not feel we can justify. B.S. & B. now has
a new Dial RS series that is superior to K.P. 90.
but, still can't see justification since new dish
have been installed.
- 4) Answered in #3.

AM-686-A

Signed

Jan

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