

## How to determine if a rubber expansion joint is damaged and must be replaced

Most failures related to rubber expansion joints are not catastrophic in nature and signs of fatigue and/or premature failure can be easily detected long before the actual failure occurs.

Common signs of rubber expansion joint deterioration:

### Cracking

Cracking may not be dangerous if only the outer cover is involved and the fabric is not exposed. Cracking is usually the result of excess extension, compression, angular or lateral movements. Such cracking is identified by:

- Flattening of the arch.
- Cracks at the base of the arch . cracks at the base of the flange.

If the fabric is visible the expansion joint should be replaced.



### Metal Reinforcement

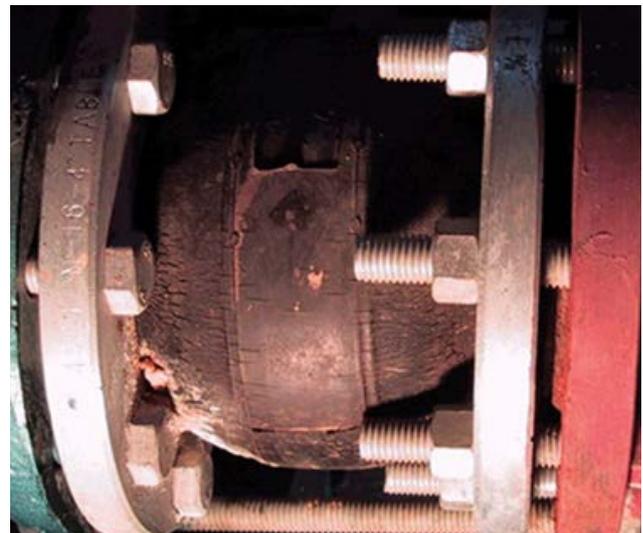
Wire or solid steel rings embedded in the carcass are frequently used as strengthening members of the joint. If the metal reinforcement of an expansion joint is visible through the cover, the expansion joint should be replaced as soon as possible. Additionally, if any external metal reinforcement is exhibiting signs of fatigue or wear, the expansion joint should be replaced as soon as possible.

### Excessive Movement

Extreme dimensional changes beyond the acceptable limits for which the expansion joint has been designed are obvious signs of excessive movement. This excessive motion could be caused by the failure of an anchor or some other piece of equipment in the pipeline or a wrong prescription or design of the expansion joint. Excessive compression, extension, lateral or angular movement may not be signs of imminent failure but the expansion joint must be replaced by a unit designed for such purposes. An excess of movement can cause cracks in a short-term so special attention should be paid to the movements to ensure that the expansion joint meets the system requirements.

### Rubber Deterioration

If the rubber feels soft, gummy, too stiff or brittle a replacement unit must be considered as soon as possible. Chemical attack or ageing is the most likely cause.



## Blisters-Deformation-Ply Separation

Some blisters or deformations, when on the external portions of an expansion joint, may not affect the proper performance of the expansion joint. These blisters or deformations are cosmetic in nature and do not require repair. If major blisters, deformations and/or ply separations exist in the tube, the expansion joint should be replaced as soon as possible. Ply separation at the flange outer diameter can sometimes be observed and is not a cause for replacement of the expansion joint.

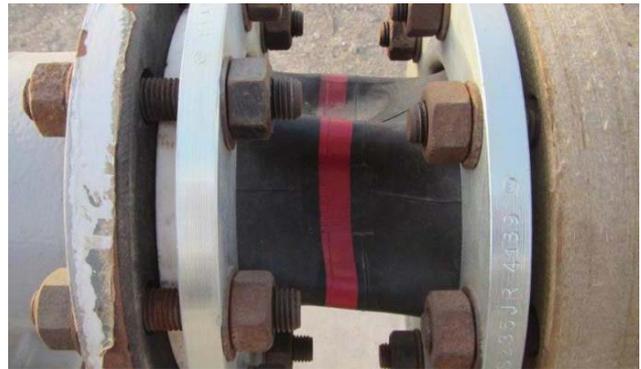
## Leakage

If leakage is occurring from any surface of the rubber expansion joint, except where flanges meet, replace the joint immediately. If leakage occurs between the mating flange and expansion joint flange, tighten all bolts. If this is not successful, turn off the system pressure, loosen all flange bolts and then re-tighten bolts in stages by alternating around the flange. Make sure there are washers under the bolt heads, particularly at the split in the retaining rings. Remove the expansion joint and inspect both rubber flanges and pipe mating flange faces for damage and surface condition. Repair or replace as required. Also, make sure the expansion joint is not over elongated as this can tend to pull the joint flange away from the mating flange resulting in leakage.



## Ballooning or flattening of the convolution

Ballooning of the arch may mean over-pressure and a flattening probably means that there is vacuum and such vacuum has not been considered in the design of the Expansion Joint. If bulging or flattening of the arch occur, the expansion joint should be replaced as soon as possible.



Expansion joints rating for temperature, pressure, vacuum and movements must match the system requirements. If the system conditions exceed those of the expansion joint selected it may be a cause of failure. It is important to review the piping system layout, medium, pressure, temperature, movements, and other items which may affect the performance of the expansion joint.

Check to make sure the elastomer selected is chemically compatible with the process fluid or gas.

## Replacement Criteria

If an expansion joint is in a critical service and is five or more years old, consideration should be given to maintaining a spare or replacing the unit at a scheduled outage. If the service is not critical in nature, observe the expansion joint on a regular basis and plan to replace after ten years service to ensure a margin of safety. Applications vary and life can be as long as 30 years in some cases.

More information available at [www.macoga.com](http://www.macoga.com)

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