

## TECHNICAL SOLUTION FOR IRRIGATION PIPES GASKET

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*The hydraulic plate seal made of aluminium pipes with nominal flow of 100 mm and operating pressure of 0.5 MPa. The crossing pipes with a length of 6.0 m are composing the installation of sprinkling watering with manual actuation and stationary watering IIAM type. The construction material is of rubber accessories, according to STAS 7277-83. The plate consists of an out lip, a lip inside a frontal area of an elastic sealing membrane that can be found in some rectangular equidistant channels. The technical solution represents the subject for an application submitted for getting a patent of invention no. 2006/00102. The plate has a high performance due to its simple and resistant structure, emptying with a higher speed, allowing a set over up to 7 degrees at each coupling on both sides of the alignment, for making curve trajectories.*

**Keywords:** irrigation, pipe, plate seal

The solution presents a fitting for pipes, used at coupling the irrigation pipes, for providing seal for pressure action and for discharging water from pipes, when pressure decreases as a result of stopping supply. The fitting seals the couplings of the Al pipes, with a nominal diameter of 100 mm and an operational pressure of max. 0.6 Mpa.

### MATERIAL AND METHOD

The pipes are presented in pipe sections with a length of 6 m and are component parts of the sprinkling irrigations with manual move and stationary watering type IIAM. Most commonly are used installations with a length of 306 m which include a number of 51 coupled sections.

When pressure decreases in the pipes remains a significant amount of water of about 2462 dm<sup>3</sup> which impede the emptying process for starting work in another position. The material used for making this fitting is rubber which is in accordance with STAS 7277 83. This has to be of a hardness of 40 - 45 shore and must be tested at the pressure of 0.9 Mpa with water which should not exceed 30 °C.

The warps must not be over standards STAS 9220 80 the fitting must not have burrs.

The coupling is made between the edges of two close sections, from which one with a plug.

At present this is a ring shaped fitting with the characteristic cut in U composed of an outside and an inside lip and a frontal part where the two converge patent RO 56026 On the below lip are some U shape releases at equal distance placed parallel with the direction of the water flow.

This kind of fitting has the following disadvantages:

- Uneven size releases some exceeding the limit of 0.5 of the width and which will discharge more water;
- The reduction of the contact area of the inside lip with the sealing surface as a results of the releases;
- At releases appear many burrs and irregularities of their borders.

## RESULTS AND DISCUSSIONS

The technical problem solved consists in increasing sealing efficiency during work and the shortening of the time necessary for emptying, when is stopped the water supply.

The fitting is shown in figures 1 and 2 which present a longitudinal section through the 2 coupled edges and a detail of a water course.

The fitting is mounted in a pipe head (1) and a plug (2) which is assembled and can be unmounted by means of a hook (3) mount at on the edge (1). The hook is inserted in one of the two releases of a seating (4) which is welded on the plug (2).

Inside the plug in a (U) shape seating with rounded edges it is mounted a rubber fitting (5) including an outside lip (a) and an inside lip (b) wider than (a) and a frontal part (c). Between the outside lip and the inside lip it is fixed an elastic sealing membrane (d).

On the frontal part (c) close to the edge which separates the inside lip of the elastic membrane are made at equal distance on the entire circumference at least 3 rectangular channels connected with the outside. The channels have the width chosen so that they can be covered by the membrane (d) at operational pressure. The number of perforations (punctures) depends on the water flow necessary to be discharged.

This fitting is advantageous due to the following characteristics:

- Plain and resistant structure;
- Increased work safety, the mounting of this fitting having no effect upon the hydraulic discharge circuit;
- The maxim sealing effect as a result of the contact of the fitting on the entire circumference of the inside lip;
- Reaches the operational pressure by providing sealing in a short time;
- Discharge of a smaller amount of water at the stage of water filling of the pipe;
- Faster Self evacuation of the pipe;
- The setting over with up to 7 degrees at each coupling on both sides of the line for making curved tracks.

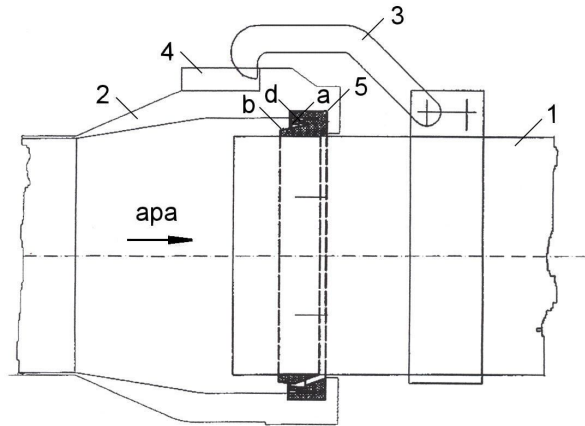


Figure 1 Longitudinal cut view through the two sections

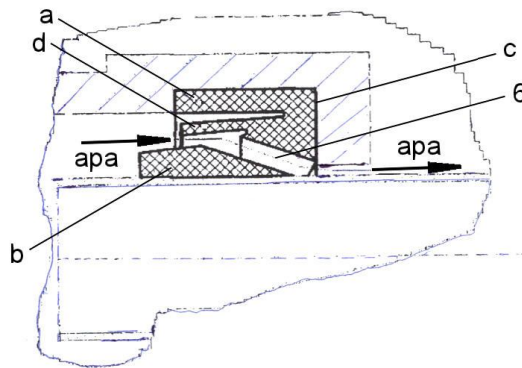


Figure 2 Water track at discharge

At water supply under pressure, at the increase of pressure it is evacuated the air from inside and the sealing membrane (*d*) is folded, impeding the enter in the rectangular channel (6) which discharges water outside through the space between the pipe edge (1) and the plug (2). At this stage as a result of sealing couplings, the pipes fill with water and the watering installation works under pressure.

After finishing watering and interrupting the supply with water, the inside pressure decreases towards 0, as a result of the contact with the air through the sprinkling pipes, the pipe remaining filled with water.

In these conditions the membrane (*d*) gets back to its initial position, being resettled the hydraulic circuit shown in figure 2 which allows the discharge of water from the pipes passing through the fitting (5) through the channels (6) which have the exit placed between the inside lip (*d*) and the frontal part (*c*).

The self evacuation of the pipe is performed in the right time, without producing any marching.

The companies which manufacture watering equipment type IIAM and which may be potential beneficiaries are Piatra Neamt SC RIMAGRA SRL, Bals INSTIRIG - SA, Vaslui PIVOT INTERNATIONAL - SA, Cluj MECANICA MARIUS - SA.

## CONCLUSSIONS

This solution is suitable for coupling irrigation pipes with the diameter of 100 mm, for providing sealing at working pressure of max. 0.6 Mpa and discharging when the pressure decreases cause of stopping the supply.

The fitting seals the space between the membrane (*d*) and the channels (6) which are rectangular placed at equal distance and which can fold when applied hydraulic pressure is providing the emptying of the pipes without hydraulic pressure.

The solution needs an easy mounting and dismantling.

The structure is plain and resistant.

The pipe allows a setting over of up to 7 degrees at each coupling on both sides of the line for making craved tracks.

It can be made for plastic pipes with the nominal diameter of 50 mm.

The fitting represents subject for being granted patent of invention no. A/2006/00102.

## BIBLIOGRAPHY

1. Nicolescu C., Anghel S., 2006 - Fitting for pipes request for being granted patent of invention no. a/2006/00102.
2. \*\*\* - Patent Romania no.56026 int cl A 01 G 25/12.