

Clarifications to Canadian Dam Association 2001 Paper B2-2  
**Use and Application of Inflatable Dam Seals in Large Concrete Dams**

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The author wishes to clarify some information in the Canadian Dam Association 2001 paper B2-2 Inflatable Dam Seals.

**One:** Seal Dimensions

In discussions and writing the terms 6 inch and 8 inch seals are used regularly. These seals have actual outside diameters of approximately 5.75"-5.90" and 7.75"-7.90" respectively and are designed to fit nominal hole diameters of 6 inch and 8 inch boreholes. The borehole sizes may vary somewhat due to actual drill bit size and drilling technique. Other sizes are available.

The seals are laid up by hand on mandrels of 5 inch and 7 inch diameters respectively. Lay-up of approximately ½ inch materials is used. In the curing phase, this outside diameter is reduced slightly. This does not affect the performance of the seal. Other nominal sizes are available as well. The largest diameter seal manufactured to date is 14 inch outside diameter.

**Two:** Seal Expansive Qualities

The technical specifications states the seal should exhibit 15% lateral growth at 5 psi. This should be corrected to read:

“The seals should exhibit expansive properties even at very low pressures (5psi)”.

Field and laboratory tests on new seals during the air pressure leak test show lateral expansion at 5 psi to be about 4-5%. The seals are new at this point and are stiff. Once test sections are exposed to higher pressures, there is substantial expansion at 18 psi. As this pressure is lowered, 15% expansion is seen at about 7 psi. This one test was performed for USACE on a 6 inch nominal diameter 15 foot seal test section. Differences in lateral expansion can be expected on varying seal diameters and lengths. See attached photo below.

Production seals should not be exposed to these higher pressures. These seals are designed to be pressurized in a confined environment, and are designed to expand to fit irregularities in the borehole. A six inch seal should be installed in a six inch borehole, not a seven inch borehole, etc. These seals are designed to be flexible/expansive to move with joint and concrete thermal movement as well as have minimal extrusion into

concrete saw cuts and cold joints. Test also showed expansion into a ½” (13mm) slot at less than 0.10 inch at 50 psi. The test section was 5 feet long with a test vessel having a 48 inch slot. (USACE Big Bend Project 2008)

The seals are hand layed up and are assembled in approximately 50 foot sections. It has been noted that different sections of the same seal exhibit different expansion rates at the same pressures. Variations in expansion can also be expected due to different batch lots of rubber and reinforcement.

There have been no changes to seal design since this paper was originally written in September 2001. Some construction techniques have been improved.

### **Three: Seal Construction**

Actual seal construction techniques are proprietary. There is no outer nylon shell used on production seals. The nylon wrap is used during manufacture and removed at the last phase of construction. It impresses upon the rubber the appearance of an outer wrap.

The author wishes to apologize for any misunderstanding.



Test section under 18 psi load.