ANCeram - Technical Data

Ceramic AlN Water-cooler : Standard Design

1. Technical Description

The flat solid water-cooler with lapped surfaces is made out of aluminium nitride ceramic (AlN). Cooling plugs, arranged in form of waffles inside the box provide an excellent heat transfer from the ceramic to the cooling water. Water connections out of polyethylene are inserted with two seal rings. Also other connection systems, e.g. alumina tubes combined with bronze bellows or tubes made out of other different plastics are known.

2. Application

For example the cooling box is used for semiconductor elements with contact surfaces from 47 to 78 mm. The cooling water, partially with 44 % parts Antifrogen N, doesn't get in direct contact with the semiconductor box (insulated, closed cooling system).

3. Definition of measuring method

Data of coolant flow, pressure drop and thermal resistance refer to one cooling box. For measurements a test unit is built out of 5 similar cooling boxes. Measurements are made on the central cooler (see Fig. 1) .

The resulting thermal resistance is an average value taken from the eight different temperatures of the contacting copper surfaces. Thermal resistance is calculated from the difference between the average temperature value and the inlet temperature of the cooling medium divided by the power loss of the transistor. Inlet temperature of the cooling medium is 60 °C.

4. Basic characteristics

Material	:	AlN 180
Diameter of contact surfaces	:	95 mm
Cooling medium	:	water with 44 % Antifrogen N

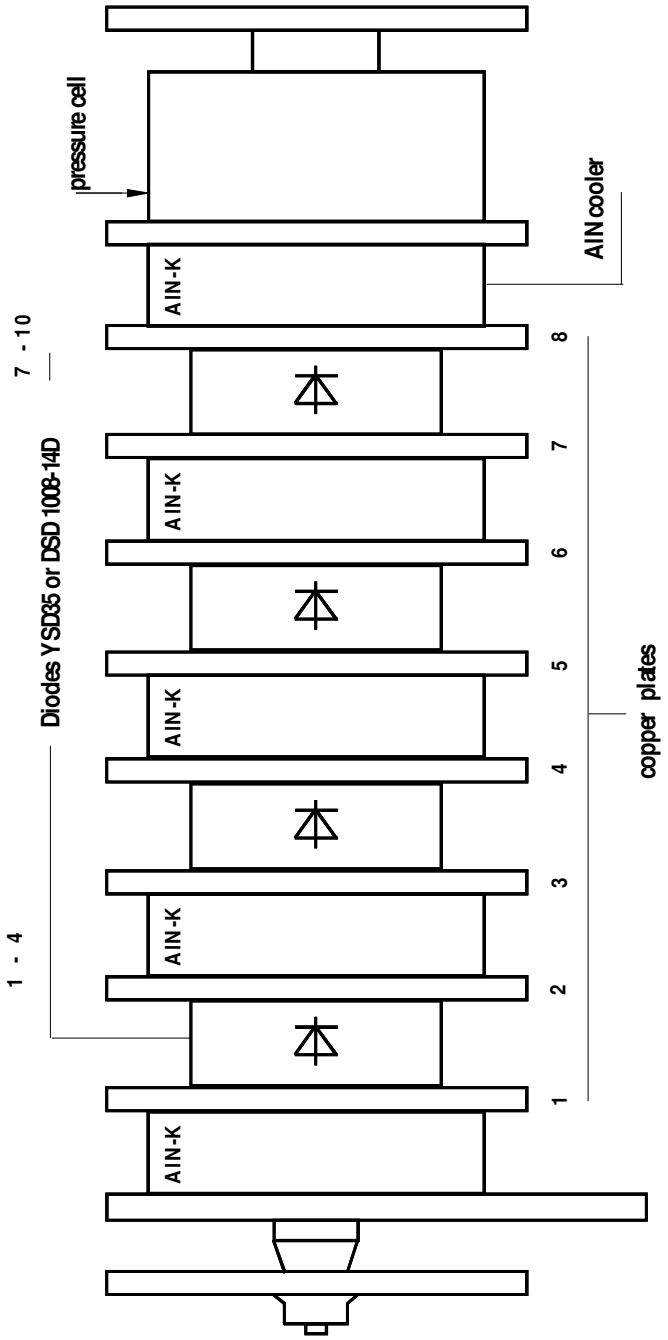
Different versions, e.g. without center bore hole, different OD or position of the bore holes are available on request

5. List of figures

Fig. 1 : Mounting of rectifiers and diodes
Fig. 2 : Thermal resistance vs. flow volume
Fig. 3 : Deviation of measured values on 4 different cooling boxes of different lots at a power loss of 1,5 kW using diodes YSD 35 with 78 mm diameter
Fig. 4 : Pressure drop vs. flow volume
Fig. 5 : Drawing of the actual cooling box
Fig. 6 : Thermal resistance vs. flow volume
Fig. 7 : Pressure drop vs. flow volume

Further technical details about our ceramics can be taken from our actual data sheets.

Fig. 1: Mounting of rectifiers and diodes



Diode :	YSD 35	Diameter of contact area	: 78 mm
Diode :	DSD 1008-14	Diameter of contact area	: 47 mm
Load at YSD 35 :		39.240 N	
Load at DSD 1008-14D :		19.620 N	

Fig. 2 : Thermal resistance vs. flow volume

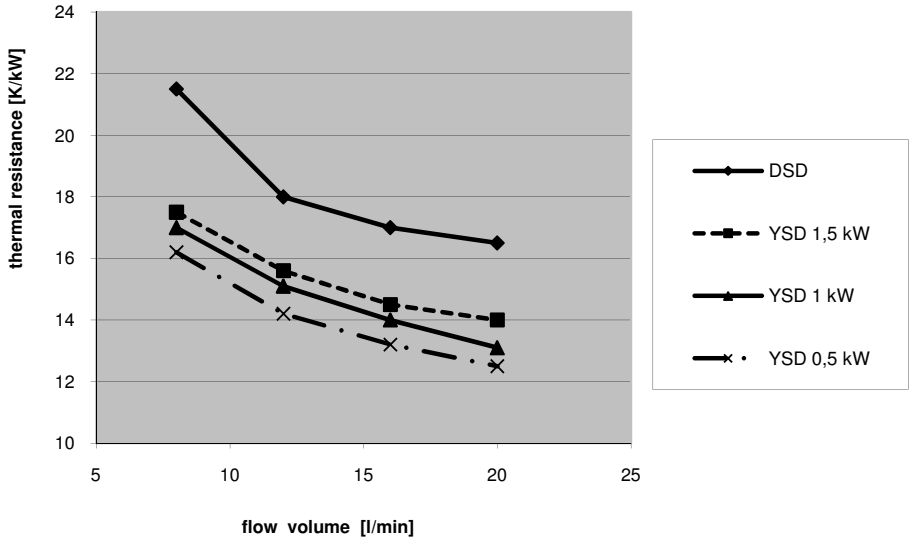


Fig. 3: Deviation of measured values

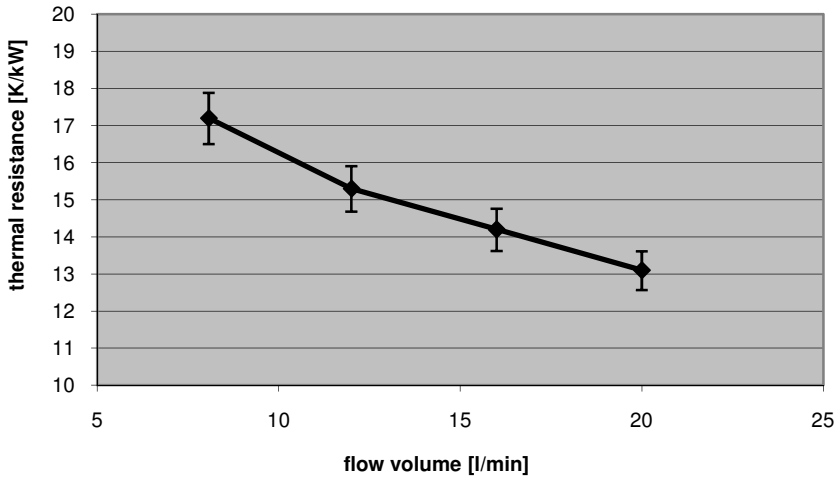


Fig. 7 : Pressure drop vs. flow volume

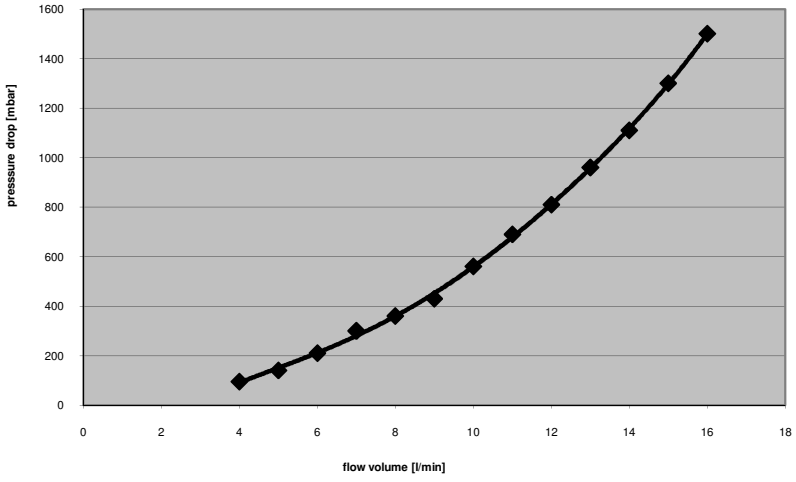
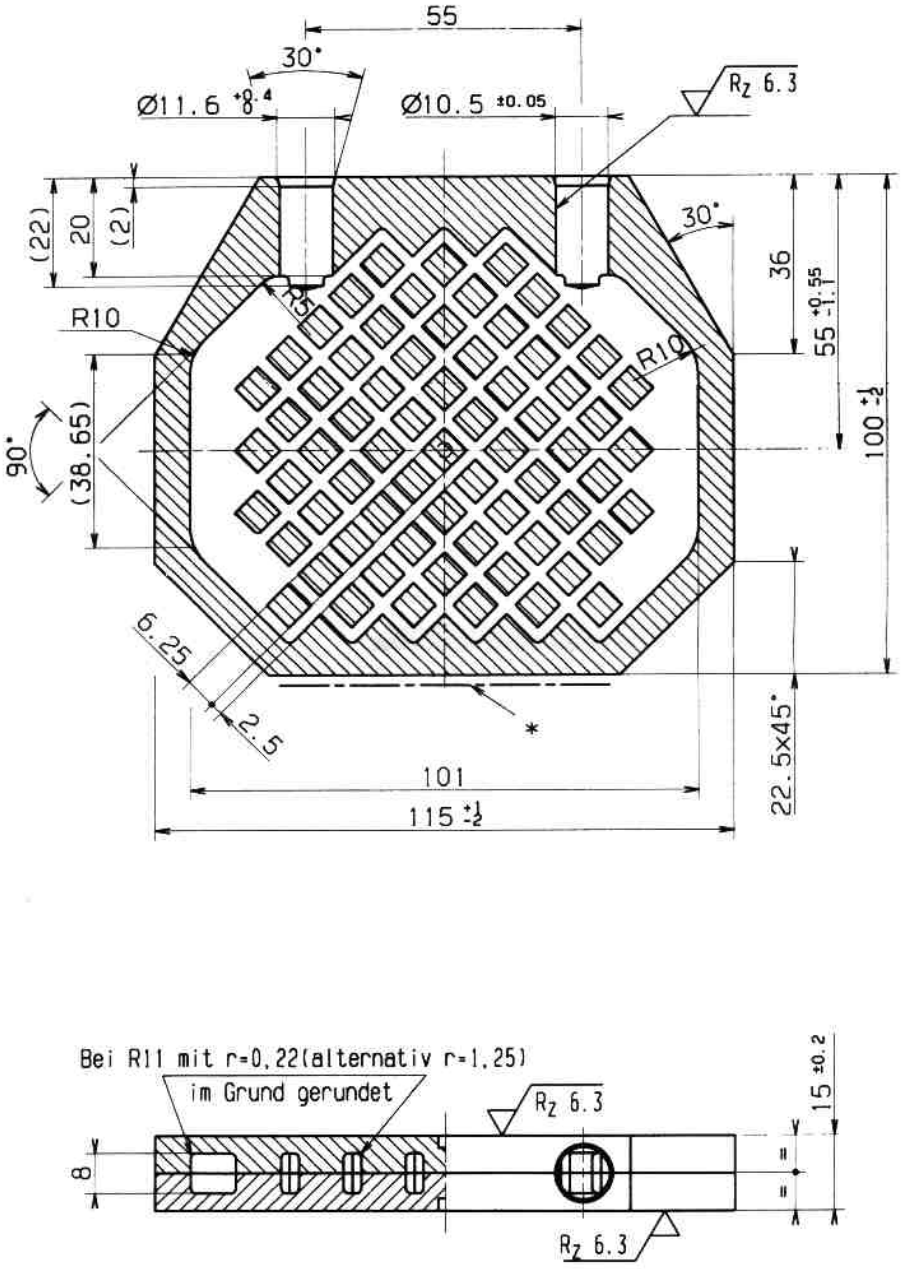


Fig. 5: Actual design of cooling box

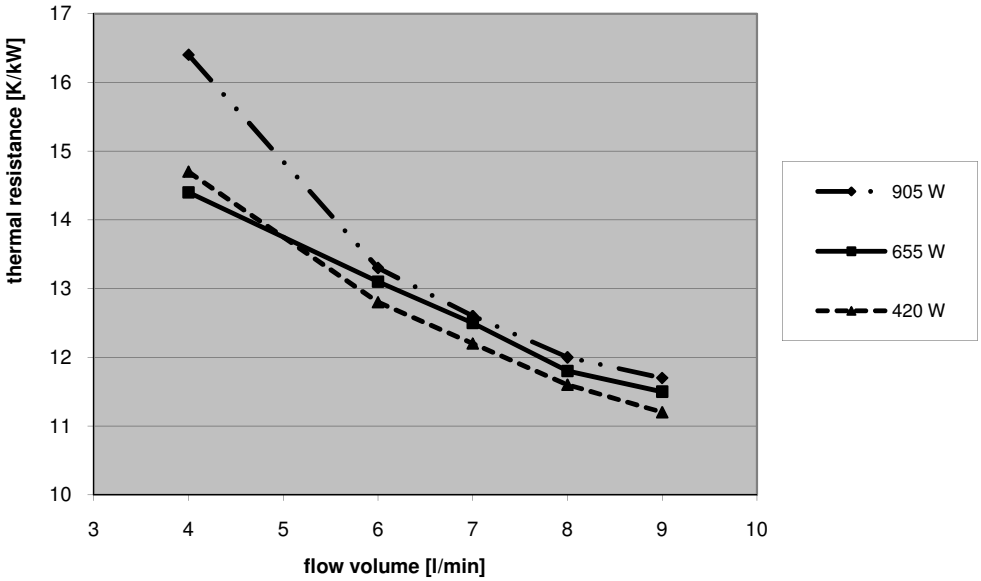
Used since more than 20 years in railway systems in Germany, Spain and Switzerland.
Since 2002 also in rectifiers of wind turbines in Germany , Denmark, Scottland, and Australia



Different customer specified sizes and shapes available on request.

The dependence of thermal resistance and pressure drop on flow volume is shown on next side..

Fig. 6 : Thermal resistance vs. flow volume



6. Safety note:

Recently we have seen indications for electrochemical corrosion effects in AlN cooling boxes when exposed for a longt term to high DC fields combined with significant levels of kationic impurities in the cooling water. Until we understand the origin of such corrosion effects, we highly recommend to check cooling boxes exposed to such or similar conditions after 3 years for potential corrosion damages.
No corrosion was seen or reported from cooling boxes exposed to AC fields and tap water.