Betamicron®/Aquamicron®-Filter Elements BN4AM

up to 10 bar, filtration rating 3, 10 µm

1. BETAMICRON®/ AQUAMICRON® ELEMENT

1.1 DESCRIPTION

The presence of water in hydraulic media is a frequent cause of malfunctions, for example, blinding of very fine filters or jamming of valves and these problems are often incorrectly attributed to excessive levels of solid contamination. In addition, the formation of rust and the reduction in lubricity on bearings and slide bars can result in significant deterioration in system function.
In other words, in addition to solid particles, water is a serious "contaminant" of the hydraulic medium.
Since the conventional methods of dewatering are in most cases uneconomical in relation to the purchase price of the system, HYDAC BN4AM technology provides an economically acceptable, yet effective method of separating water from hydraulic media which at the same time achieves absolute filtration of solid particles.

General
BN4AM filter elements are specifically designed to separate water, and achieve absolute filtration of solid particles, from mineral oils, HFD-R oils and biodegradable oils.
A superabsorber reacts with the water present in the medium and expands to form a gel, from which the water cannot be extracted again even by increasing the pressure.
These filter elements cannot remove dissolved water from the system, i.e. water below the saturation level of the hydraulic medium. Solid particle filtration is achieved as a result of the Betamicron® filter element structure.

1.2 GENERAL DATA

Max. permitted operating pressure	10 bar
Max. permitted Δp across element	10 bar
Temperature range	0 °C to +100 °C
Flow direction	From outside to inside
Filtration rating	3, 10 µm
Bypass cracking pressure	Return line filter element ("R"): standard 3 bar (others on request)
Category of filter element	Single use element

1.3 PRINCIPLES OF THE BN4AM COMBINED FILTER ELEMENTS

- BN4AM filter element based on inorganic and water-absorbent fibres
- Exemplary absorption of water from mineral oils with the aid of a superabsorber embedded in the filter material
- Excellent absorption of finest particles over a wide differential pressure range (3, 10 µm absolute)
- Exemplary β-stability over wide differential pressure ranges
- Extremely high contamination retention capacity
- Good chemical resistence through the use of epoxy resins for impregnation and bonding
- Element protection due to high burst pressure stability (e. g. during cold starts and dynamic differential pressure surges)

1.4 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743
- Compressor oils DIN 51506
- Biodegradable operating fluids VDMA 24568 HETG, HEES, HEPG
- Fire-resistant fluids HFA, HFB, HFC and HFD
- Operating fluids with high water content (>50% water content) on request

The following principles apply to water separation:

High water content	→	High absorption rate	
Low water content	→	Low absorption rate	
Unsaturated filter element	→	High absorption rate	
Saturated filter element	→	Low absorption rate	
Hydraulic filter area load (l/min/cm²)	↘	Absorption rate Water absorption capacity Residual water content	↗ ↗ ↘
Static pressure	↘	Absorption rate Water absorption capacity Residual water content	= = ↘
Pressure and flow rate fluctuations present		Absorption rate Water absorption capacity Residual water content	↘ ↘ ↗
Dispersant/detergent additives present		Absorption rate Water absorption capacity Residual water content	↘ = ↗

E 7.218.0/06.14

2. MODEL CODE

(also order example)

0660 R 040 BN4AM /-V

Size
0330, 0500, 0660, 0750, 0850, 0950, 1300, 1700, 2600, 2700

Type
R Return line filter element

Filtration rating in µm
003, 010

Filter material of element
BN4AM Betamicron®/Aquamicron®

Supplementary details
V FPM (Viton) seal

3. DETERMINATION OF THE WATER CONTENT G_W PRESENT IN THE SYSTEM

Two methods can be employed to determine the water content G_W present in the system:

- Hydrogen gas method
- Karl Fischer method to DIN 51777

The hydrogen gas method can be carried out using portable test equipment, e. g. the HYDAC Water Test Kit WTK, however, reading accuracy at water contents below 500 ppm is limited.

The Karl Fischer method on the other hand can only be conducted in the laboratory. It is available from HYDAC Filtration Technology as a laboratory service.

The water content G_W is usually given in ppm (parts per million) or in percent (100 ppm corresponds to 0.01%).

3.1 WATER RETENTION - QUICK SIZING TABLE

Size	Recommended filter flow rate [l/min]	Water absorption capacity [cm³] at Δp = 2.5 bar and a viscosity of 30 mm²/s
330	13	180
500	19	280
660	28	400
750	48	691
850	35	520
950	39	570
1300	54	790
1700	73	1059
2600	109	1570
2700	98	1422

4. FILTER CALCULATION / SIZING

The total pressure drop of a filter at a certain flow rate Q is the sum of the housing Δp and the element Δp and is calculated as follows:

$\Delta p_{total} = \Delta p_{housing} + \Delta p_{element}$

$\Delta p_{housing}$ = see housing curve in the relevant filter brochure

$$\Delta p_{element} = Q \cdot \frac{SK^*}{1000} \cdot \frac{viscosity}{30}$$

(*see point 5.1)

5. ELEMENT CHARACTERISTICS

5.1 GRADIENT COEFFICIENTS FOR FILTER ELEMENTS

The gradient coefficients in mbar/(l/min) apply to mineral oils with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity.

Size	3 µm	10 µm
330	8.7	3.0
500	5.7	2.0
660	3.5	1.2
750	2.3	0.8
850	2.8	0.9
950	2.4	0.8
1300	1.6	0.6
1700	1.3	0.5
2600	0.8	0.3
2700	1.0	0.3

5.2 CONTAMINATION RETENTION CAPACITY IN G

The contamination retention and particle filtration performance of an element are established in the multipass test to ISO 16889. This procedure with its precisely defined test conditions and a standard test dust (ISO MTD) enables the performance data of different elements to be compared.

Size	3 µm	10 µm
330	55.0	60.0
500	83.9	93.9
660	120.0	140.0
750	209.3	234.5
850	156.5	175.3
950	170.0	190.0
1300	240.0	270.0
1700	320.8	359.4
2600	490.0	540.0
2700	430.7	482.5

For information on bypass valve curves, please see Filter Element (Quick Selection) brochure no.: E 7.221../..

NOTE

The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC Filtertechnik GmbH
Industriegebiet
D-66280 Sulzbach/Saar
Tel.: 0 68 97 / 509-01
Fax: 0 68 97 / 509-300
Internet: www.hydac.com
E-Mail: filter@hydac.com