

# SEPARATION TECHNOLOGIES

## ION EXCHANGE RESINS

# DUOLITE A 102 D

## ENGINEERING DATA SHEET (COUNTER CURRENT REGENERATION)



Duolite A 102 D is a type 2 strong base Anion Exchange Resin. These data provide information to calculate the silica leakage and operating capacity of Duolite A 102 D used with counter current regeneration.

The properties of Duolite A 102 D are described in the product Data Sheet.

### SILICA LEAKAGE

The average silica leakage is obtained by multiplying the basic leakage value from Table 1 by the correction factors A, B and C from Tables 2 to 4

$$LEAK = LEAK_0 \times A \times B \times C$$

**TABLE 1 : Basic Silica Leakage versus NaOH regenerant level.**

NaOH g / L	Leakage ppm SiO <sub>2</sub> (Leak <sub>0</sub> )
30	0.050
40	0.036
50	0.024
60	0.017
80	0.010

**TABLE 2 : Leakage Correction Factor A versus Silica to Total Anions ratio.**

SiO <sub>2</sub> %	Factor A
1	0.2
5	0.5
10	1.0
20	2.0
30	3.0
40	4.0
50	5.0

**TABLE 3 : Leakage Correction Factor B versus Water Temperature..**

Water °C	Factor B
5	0.7
10	0.8
15	1.0
20	1.2
25	1.5
30	2.2

**TABLE 4 : Leakage Correction Factor C versus Regenerant Temperature.**

Water °C	Factor C
10	1.65
15	1.37
20	1.16
25	1.00
30	0.87

**TABLE 3 : Suggested Operating Conditions**

Maximum operating temperature _____	35 °c ( OH <sup>-</sup> ), 70 °c ( Cl <sup>-</sup> )
Minimum bed depth _____	1000 mm **
Service flow rate _____	5 to 40 BV* / hr
Maximum linear velocity _____	40 m / hr
Regenerant _____	NaOH
Level _____	30 to 100 g / L
Flow rate _____	2 to 8 BV/ hr ( minimum contact time : 30 minutes )
Concentration _____	3% to 5% .
Slow rinse _____	Minimum 2 BV at regeneration flow rate
Fast rinse _____	Same as service flow rate.

\* 1 BV ( Bed Volume ) = 1 m<sup>3</sup> solution per m<sup>3</sup> resin

\*\* For selection of lower of bed depth please contact Auchtel technical representative

**Influent Limitations**

Free chlorine	- Nil
Turbidity	- < 1 NTU
Iron & heavy metal	- < 0.1 ppm

**OPERATING CAPACITY**

The operating capacity of Duolite A 102 D is obtained by multiplying the basic capacity value from Table 6 by the correction factor D to G from Tables 7 to 10.

$$\text{Cap} = \text{Cap}_0 \times \text{D} \times \text{E} \times \text{F} \times \text{G}$$

**TABLE 6 : Basic Capacity versus NaOH regenerant level ( counter current regeneration )**

NaOH g/L	Capacity eq/L ( Cap <sub>0</sub> )
30	0.65
40	0.82
50	0.92
60	0.98
70	1.04
80	1.06
100	1.08

**TABLE 8 : Capacity Correction Factor E versus Carbon Dioxide to Total Anions Ratio.**

CO <sub>2</sub> %	Factor E
0	0.97
20	1.00
30	1.02
50	1.05
75	1.08
99	1.12

**TABLE 9 : Capacity Correction Factor F versus Silica to Total Anions Ratio and NaOH Temperature(°C)**

°C	% SiO <sub>2</sub>					
	5	10	20	30	40	50
5°C	0.96	0.93	0.87	0.83	0.81	0.79
10	0.97	0.94	0.89	0.85	0.82	0.80
15	0.98	0.95	0.91	0.87	0.84	0.81
20	0.99	0.96	0.92	0.89	0.87	0.85
25	1.00	0.98	0.94	0.90	0.88	0.86
30	1.01	0.99	0.95	0.92	0.89	0.86

**TABLE 7 : Capacity Correction Factor D versus Sulphate to Total Anions Ratio.**

SO <sub>4</sub> %	Factor D
0	0.94
25	0.97
50	1.00
75	1.03
99	1.06

**TABLE 10 : Capacity Correction Factor G versus Silica Endpoint (DSiO<sub>2</sub> = difference between average leakage and endpoint )**

DSiO <sub>2</sub> ( ppb )	Factor G
50	0.90
100	0.95
200	1.00
300	1.04

**SAFE USE INFORMATION**

A Material Safety Data Sheet is available for each product. To obtain a copy contact your Auchtel representative.

**CAUTION**

Acid and basic regenerant solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. Nitric acid and other strong oxidizing agents can cause explosive type reactions when mixed with Ion Exchange Resins. Proper design of process equipment to prevent rapid buildup of pressure is necessary if use of an oxidizing agent, such as nitric acid is contemplated. Before using strong oxidizing agents in contact with Ion Exchange Resins, consult sources knowledgeable in the handling of these materials.

*The suggestions and data in this bulletin are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale. The Company maintains a policy of continuous development and reserve the right to amend any specification without notice. DUOLITE is a trademark of Rohm and Hass Company, Philadelphia, U.S.A. and Auchtel Products Ltd. are users of the same in India.*

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## ION EXCHANGE RESINS

# DUOLITE A 102 D

## ENGINEERING DATA SHEET (CO-CURRENT REGENERATION)



Duolite A 102 D is a type 2 strong base Anion Exchange Resin. These data provide information to calculate the silica leakage and operating capacity of Duolite A 102 D used with co-current regeneration.

The properties of Duolite A 102 D are described in the product Data Sheet.

### SILICA LEAKAGE

The average silica leakage is obtained by multiplying the basic leakage value from Table 1 by the correction factors A, B and C from Tables 2 to 4

$$\text{Leak} = \text{Leak}_0 \times A \times B \times C$$

**TABLE 1 : Basic Silica Leakage versus NaOH regenerant level.**

NaOH g / L	Leakage ppm SiO <sub>2</sub> ( Leak <sub>0</sub> )
50	0.120
60	0.081
80	0.039
100	0.028

**TABLE 2 : Leakage Correction Factor A versus Silica to Total Anions ratio**

SiO <sub>2</sub> %	Factor A
1	0.2
5	1.0
10	2.0
20	4.0
30	6.0
40	8.0
50	10.0

**TABLE 3 : Leakage Correction Factor B versus Water Temperature..**

Water °C	Factor B
5	0.7
10	0.8
15	1.0
20	1.2
25	1.5
30	2.2

**TABLE 4 : Leakage Correction Factor C versus Regenerant Temperature.**

Water °C	Factor B
10	1.65
15	1.70
20	1.16
25	1.00
30	0.87

**TABLE 3 : Suggested Operating Conditions**

Maximum operating temperature.....	35 °c ( OH <sup>-</sup> ), 70 °c( Cl <sup>-</sup> )
Minimum bed depth .....	700 mm
Service flow rate .....	5 to 40 BV* / hr
Maximum linear velocity .....	40 m / hr
Regenerant .....	NaOH
Level .....	50 to 100 g / L
Flow rate .....	2 to 8 BV/ hr(minimumcontact time : 30 minutes)
Concentration .....	3% to 5% .
Slow rinse .....	Minimum 2 BV at regeneration flow rate
Fast rinse .....	Same as service flow rate.

\* 1 BV ( Bed Volume ) = 1 m<sup>3</sup> solution per

**Influent Limitations**

Free chlorine	- Nil
Turbidity	- < 2 NTU
Iron & heavy metal	- < 0.1 ppm

**OPERATING CAPACITY**

The operating capacity of Duolite A 102 D is obtained by multiplying the basic capacity value from Table 6 by the correction factor D to G from Tables 7 to 10.

$$\text{Cap} = \text{Cap}_0 \times \text{D} \times \text{E} \times \text{F} \times \text{G}$$

**TABLE 6 : Basic Capacity versus NaOH regenerant level ( Co- current regeneration )**

NaOH g/L	Capacity eq/L ( Cap <sub>0</sub> )
50	0.85
60	0.91
70	0.96
80	0.99
100	1.03

**TABLE 8 : Capacity Correction Factor E versus CO<sub>2</sub> content ( % of Total Anions )**

CO <sub>2</sub> %	Factor E
0	0.97
20	1.00
30	1.02
50	1.05
75	1.08
99	1.12

**TABLE 9 : Capacity Correction Factor F versus Silica to Total Anions Ratio and NaOH Temperature(°C)**

	% SiO <sub>2</sub>					
	5	10	20	30	40	50
5°C	0.96	0.93	0.87	0.83	0.81	0.79
10	0.97	0.94	0.89	0.85	0.82	0.80
15	0.98	0.95	0.91	0.87	0.84	0.81
20	0.99	0.96	0.92	0.89	0.87	0.85
25	1.00	0.98	0.94	0.90	0.88	0.86
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**TABLE 7 : Capacity Correction Factor D versus Sulphate to Total Anions Ratio.**

SO <sub>4</sub> %	Factor D
0	0.94
25	0.97
50	1.00
75	1.03
99	1.06

**TABLE 10 : Capacity Correction Factor G versus Silica Endpoint (DSiO<sub>2</sub> = difference between average leakage and endpoint )**

DSiO <sub>2</sub> ( ppb )	Factor G
50	0.90
100	0.95
200	1.00
300	1.04

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