KRÜGER VEOLIA

Hvordan man kan få hydraulikken i MikeUrban mere præcis

EVA temadag, torsdag d. 11 maj 2017

Date: 11 maj 2017

Hotel Nyborg Strand

WATER TECHNOLOGIES

Oversigt over præsentationen

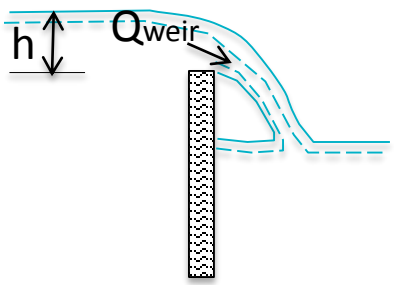
1. Overløbskanter
2. Brønde
3. Bøjeklapper og fjederklapper
4. Vandbremser
5. Tromlesier
6. Spørgsmål

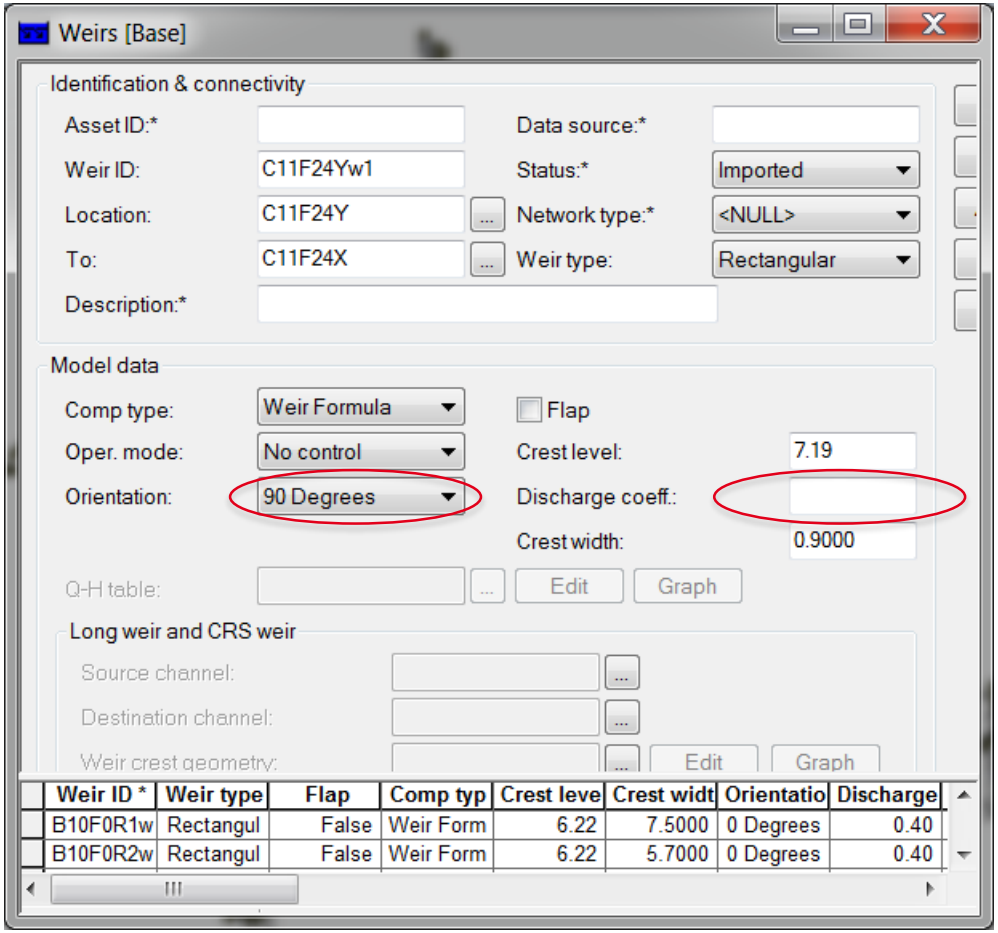
Overløb - vinkelret på overløbskanten (90 grader)

$$Q_{weir} = \frac{2}{3} C_d B \sqrt{2g} h^{3/2}$$

μ

Qweir overløb (m3/s)
Cd : overløbskoefficient
B: kantlængde (m)
h: overløbshøjde (m)





Overløb - vinkelret på overløbskanten (90 grader)

Default beregning af Cd i MU:

$$C_d = \frac{3}{(2 + K_c)^{3/2}}$$

Kc=0,5 => Cd=0,76 (μ=0,51)

- **En meget høj værdi!**
- **Formlen tager ikke hensyn til kanttype.**
- **En for høj Cd-værdi => for stort beregnet overløb.**

Typiske værdier for Cd (μ):

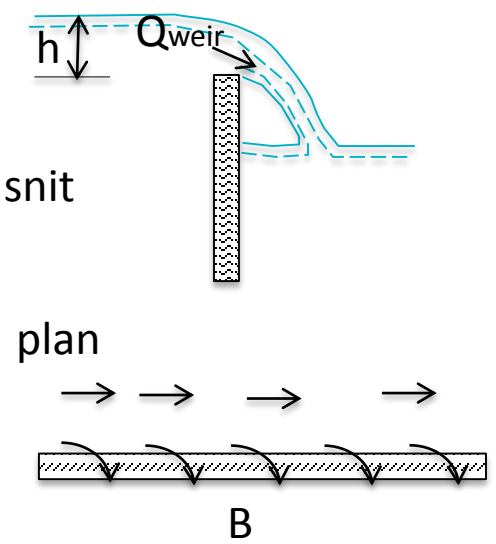
	μ	Cd
Stålkant	0,42	0,63
Beton, glat og smal kant	0,38	0,57
Beton, bred kant	0,35	0,53
Beton, nedbrudt	0,25-0,30	0,38-0,45

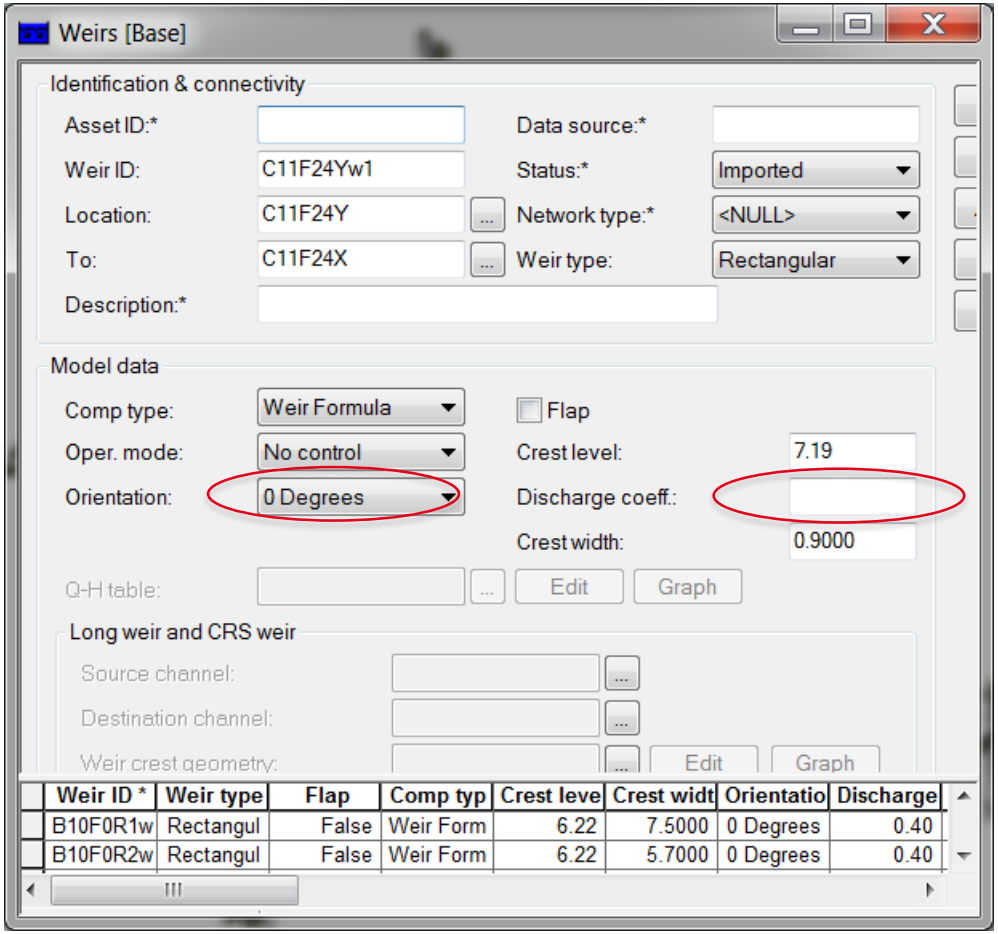
Overløb - sideoverløb (0 grader)

$$Q_{weir} = \frac{2}{3} C_d B \sqrt{2g} h^{3/2}$$

μ

Qweir overløb (m3/s)
Cd : overløbskoefficient
B: kantlængde (m)
h: overløbshøjde (m)





Overløb - sideoverløb (0 grader)

Default beregning af Cd i MU:

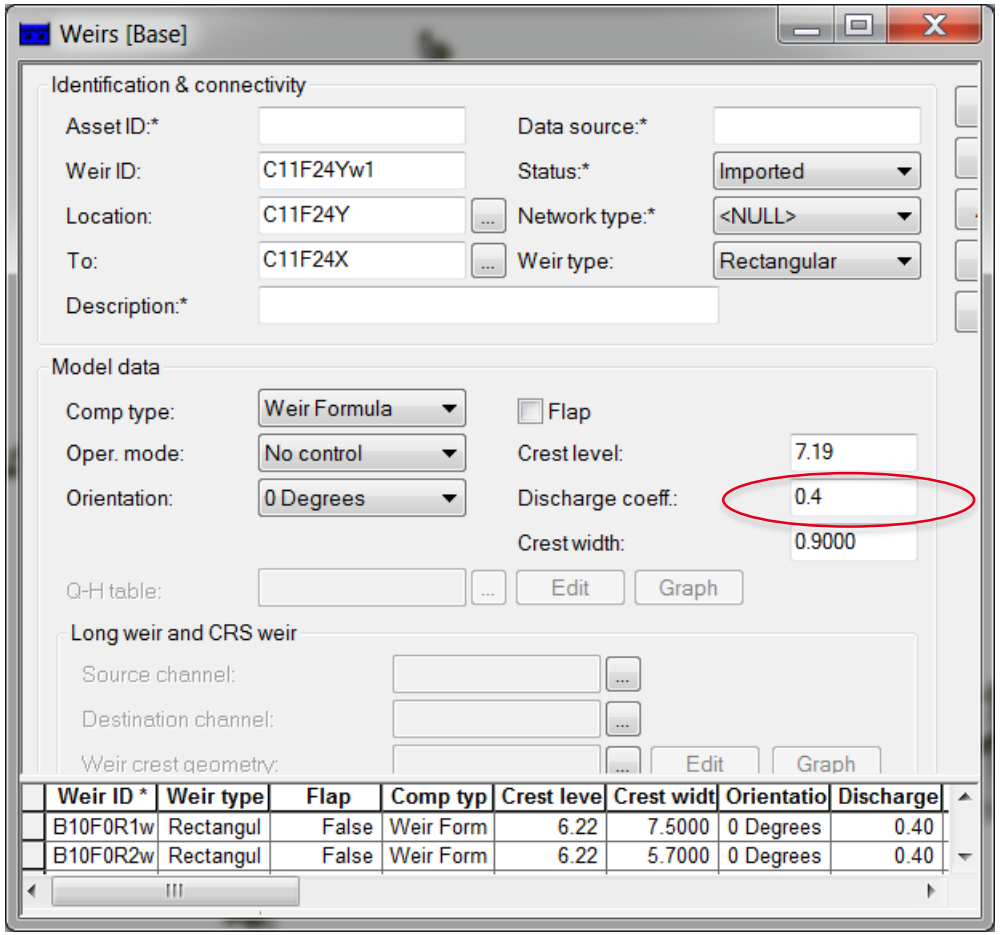
$$C_d = \frac{3}{(3 + K_c)^{3/2}}$$

Kc=0,5 => Cd=0,46 (μ=0,31)

- **Formlen tager ikke hensyn til kanttype.**
- **Formlen for sideoverløb giver Cd værdier, der er ca. 60% af værdierne for et vinkelret overløb.**

Brugerspecificeret overløbskoefficient

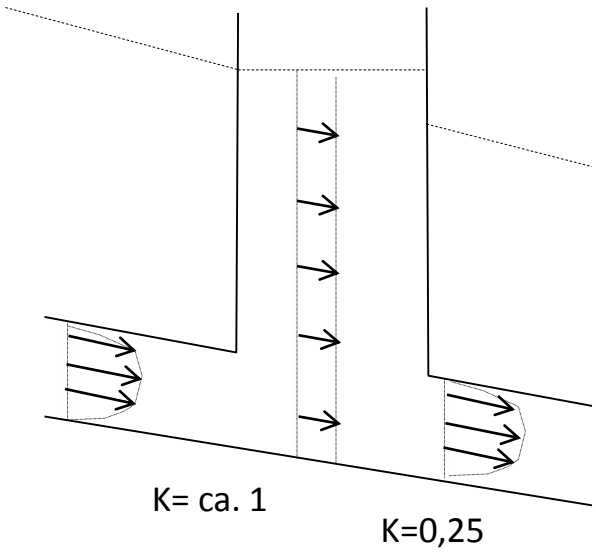
- Når overløbskoefficienten er angivet af brugeren, tages der ikke hensyn til vinklen på tilløbet.
- Husk, det er Cd, der skal angives i feltet (dvs. 3/2*µ).

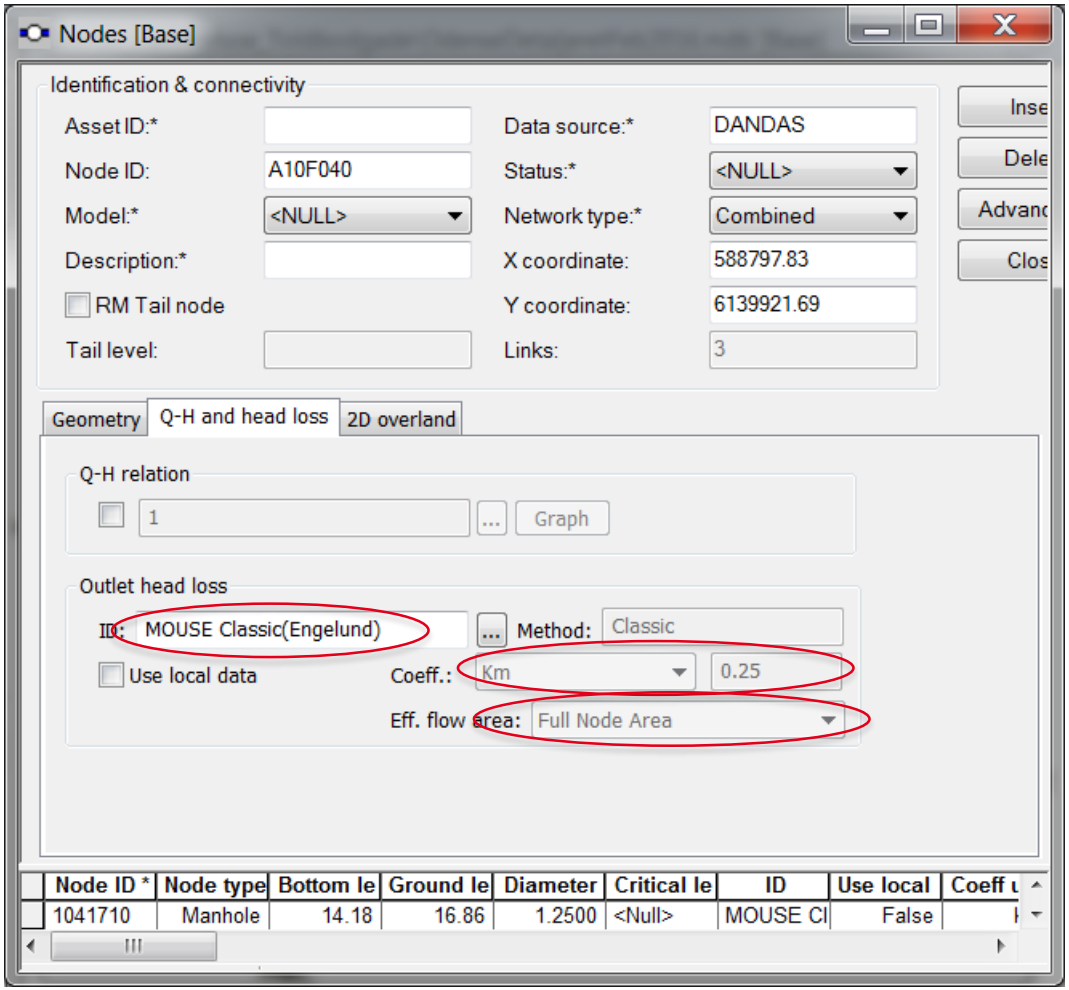


Brønde I

Standard-energitabsberegning: Engelund,
med Km=0,25

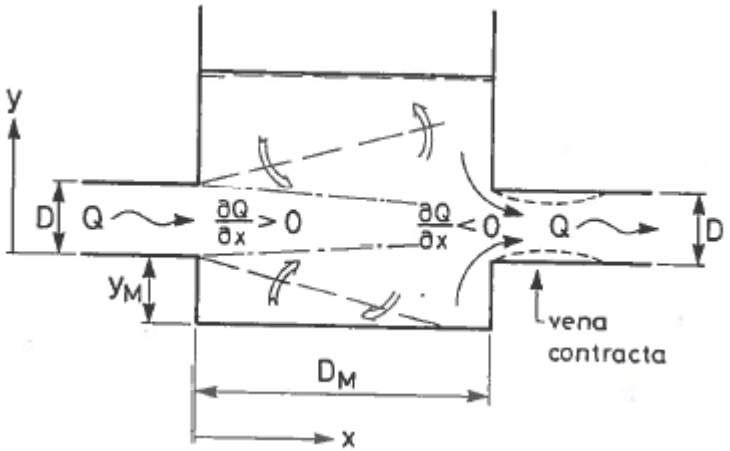
Brøndtab = indløbstab + udløbstab

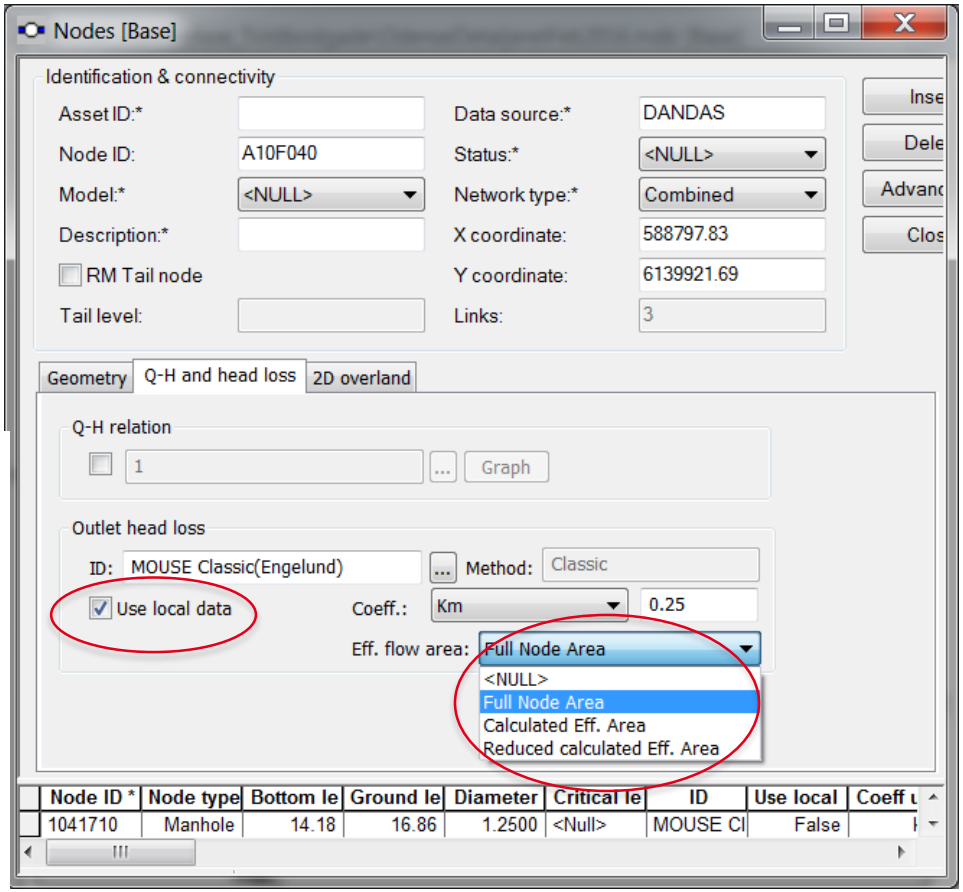




Brønde II

- Tager ikke hensyn til banketter
- Overvurderer brøndtabene
- Brøndtabet kan reduceres ved at vælge Calculated Eff. Area eller Reduced calculated Eff. Area.

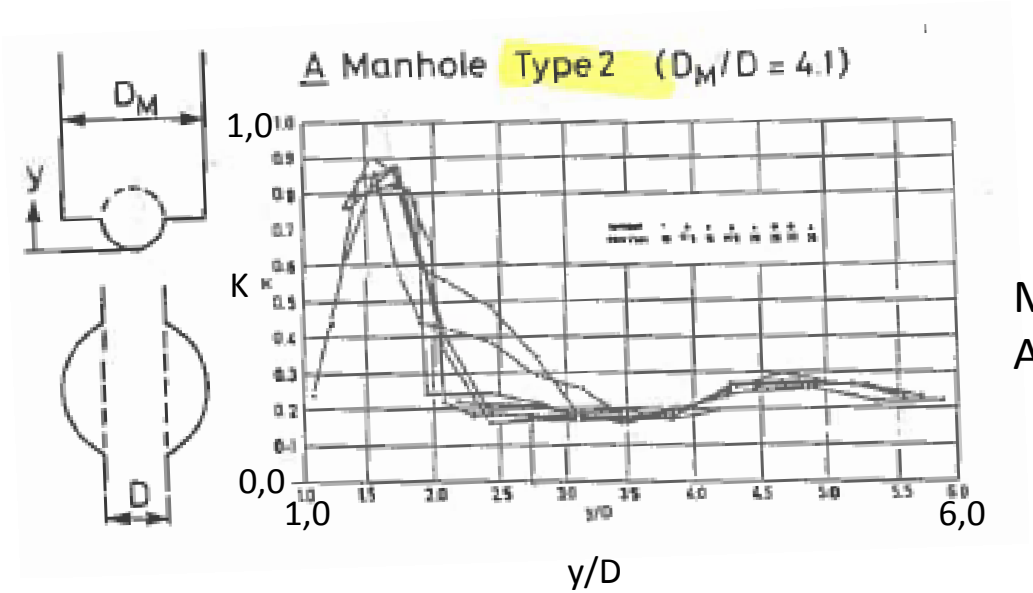




Brønde III

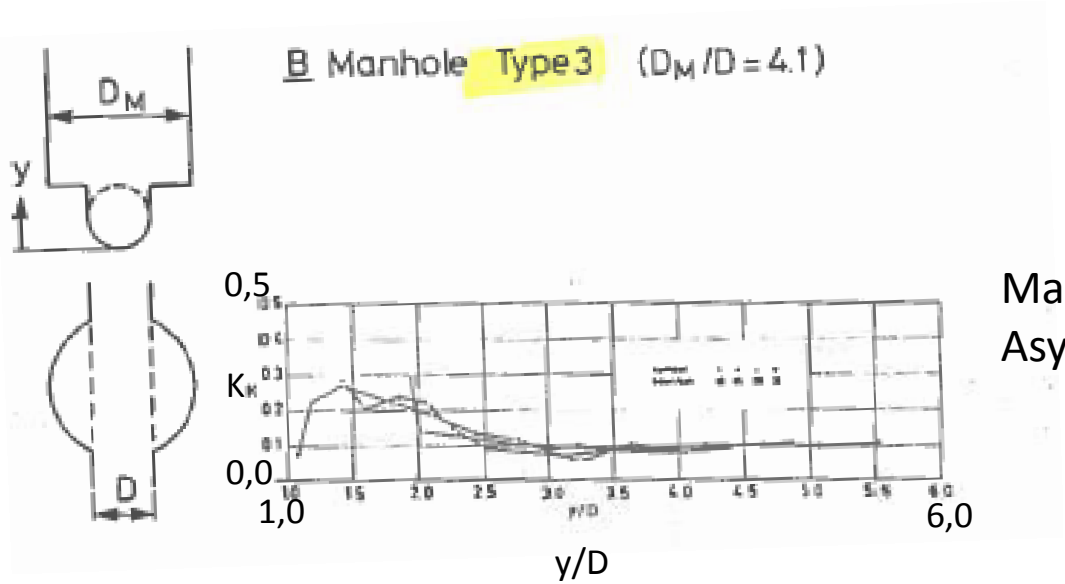
Ole Mark og Fl. Bo Pedersens artikel om brøndtab (ASCE 1990):

- Banketter betyder meget for brøndtabet
- Brøndtabet størst ved y/D=1,5 (se figurer)



Maks. værdi 0,85.
Asymptotisk værdi 0,25

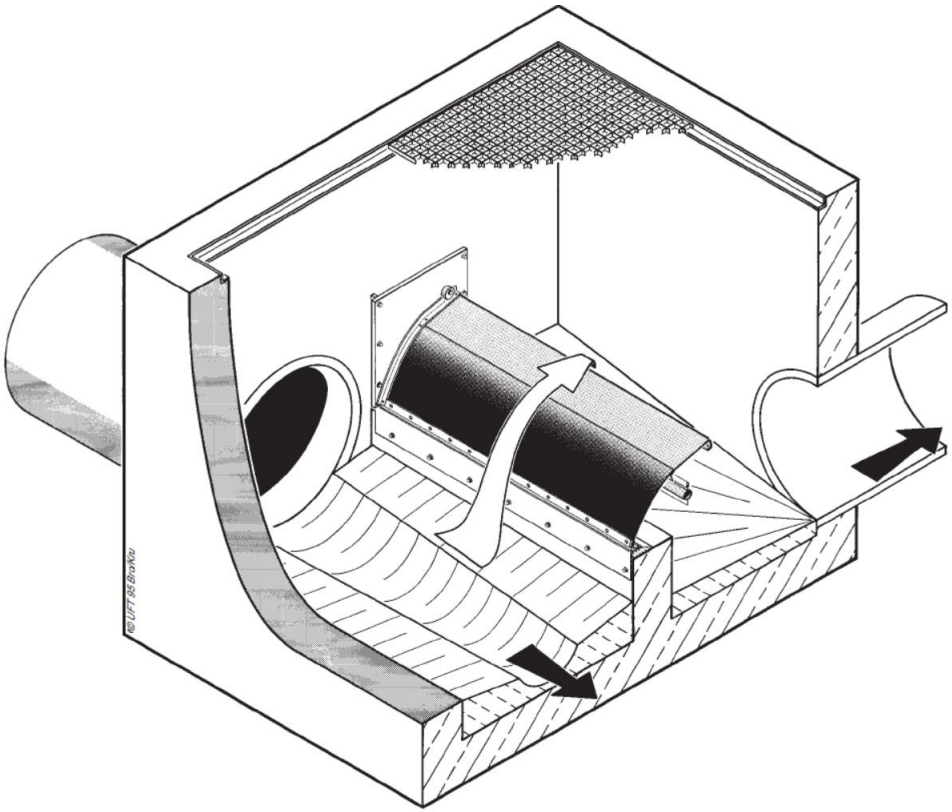
Brønde IV



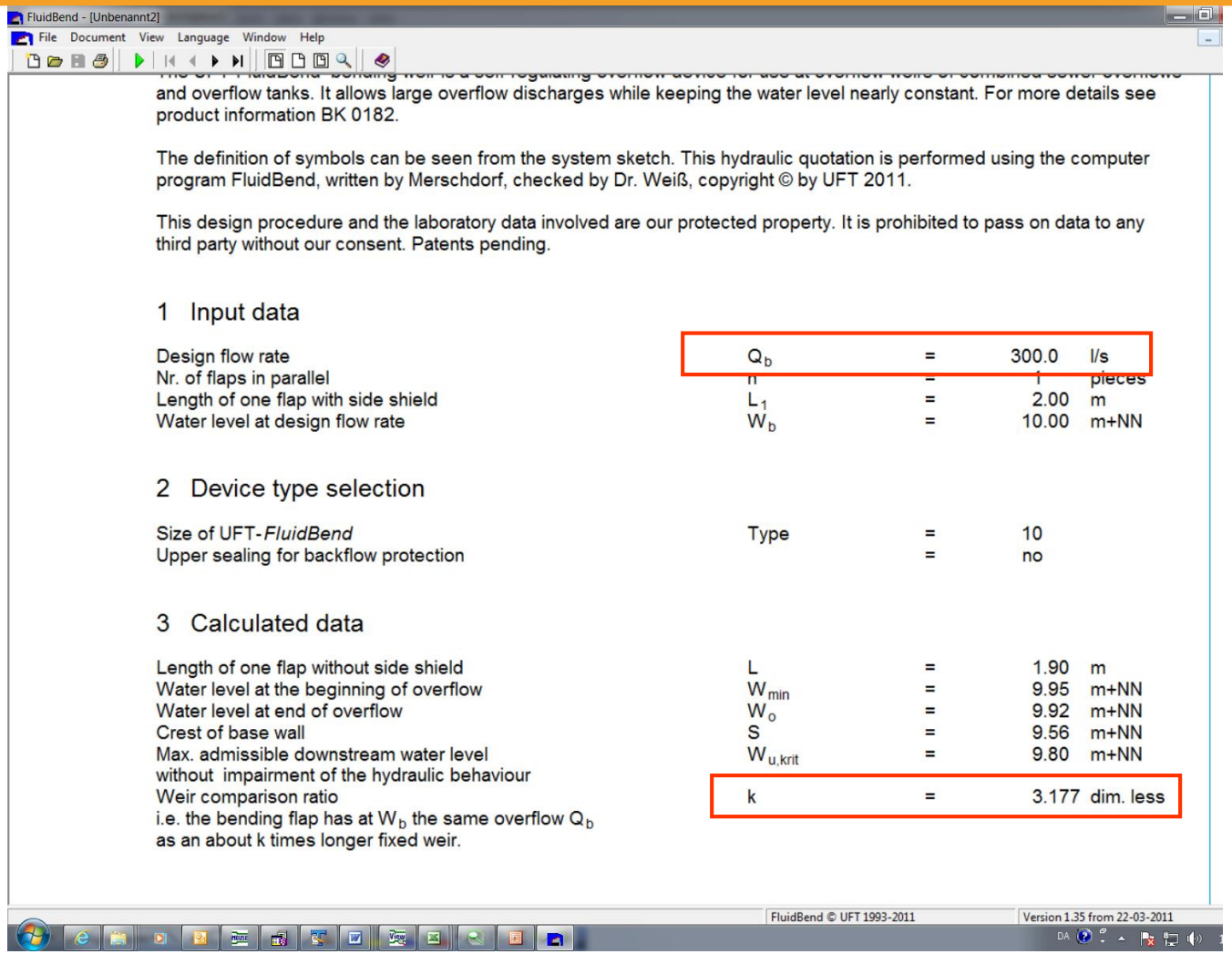
Maks. værdi 0,27.
Asymptotisk værdi 0,1

Bøjeklappe og fjederklappe

Eksempel på en fjederklap:



Bøjeklap, dimensionering 300 l/s



FluidBend - [Unbenannt2]

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and overflow tanks. It allows large overflow discharges while keeping the water level nearly constant. For more details see product information BK 0182.

The definition of symbols can be seen from the system sketch. This hydraulic quotation is performed using the computer program FluidBend, written by Merschdorf, checked by Dr. Weiß, copyright © by UFT 2011.

This design procedure and the laboratory data involved are our protected property. It is prohibited to pass on data to any third party without our consent. Patents pending.

1 Input data

Design flow rate	Q_b	=	300.0	l/s
Nr. of flaps in parallel	n	=	1	pieces
Length of one flap with side shield	L_1	=	2.00	m
Water level at design flow rate	W_b	=	10.00	m+NN

2 Device type selection

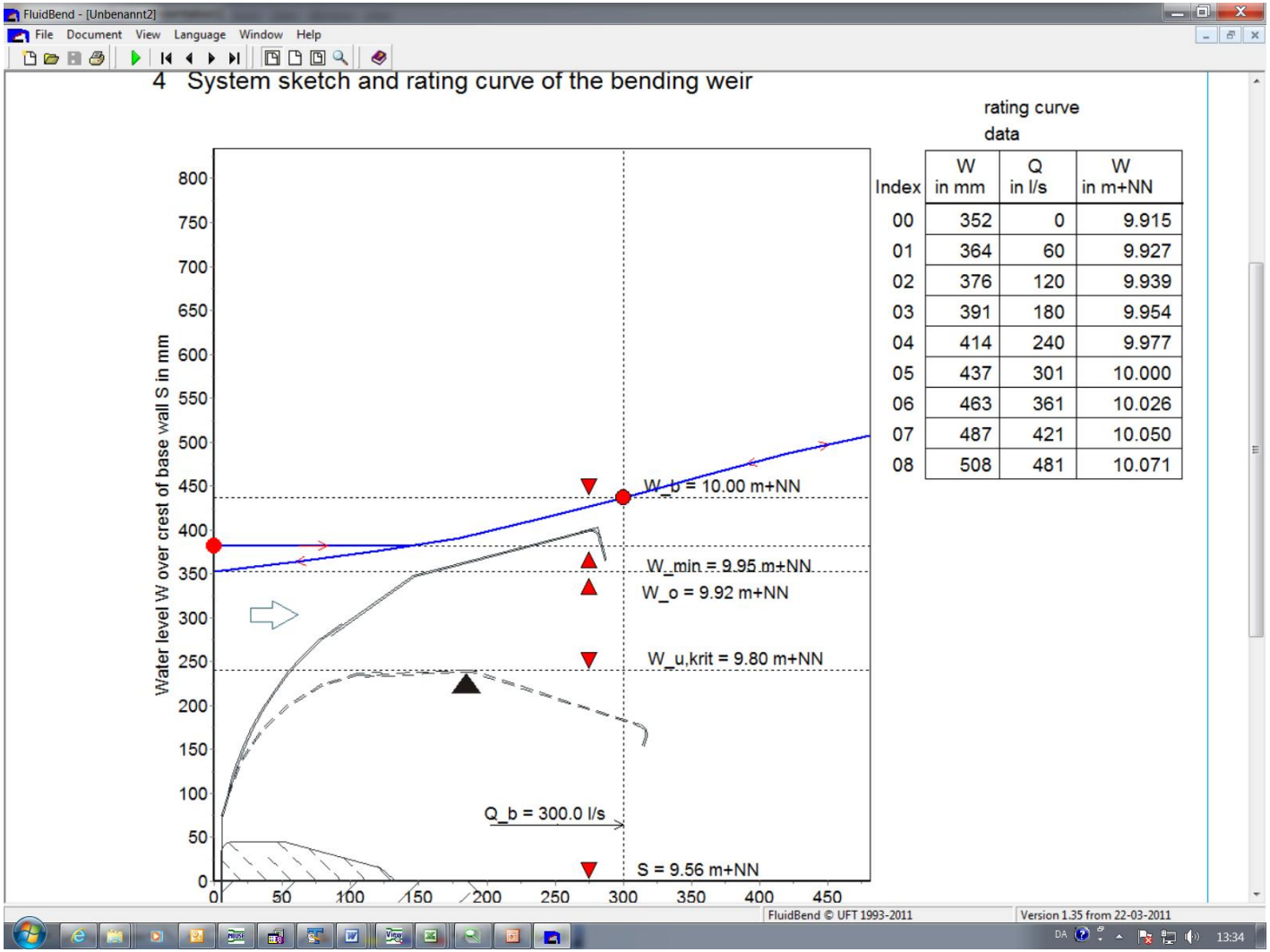
Size of UFT-*FluidBend*	Type	=	10	
Upper sealing for backflow protection		=	no	

3 Calculated data

Length of one flap without side shield	L	=	1.90	m
Water level at the beginning of overflow	W_{min}	=	9.95	m+NN
Water level at end of overflow	W_o	=	9.92	m+NN
Crest of base wall	S	=	9.56	m+NN
Max. admissible downstream water level without impairment of the hydraulic behaviour	$W_{u,krit}$	=	9.80	m+NN
Weir comparison ratio i.e. the bending flap has at W_b the same overflow Q_b as an about k times longer fixed weir.	k	=	3.177	dim. less

FluidBend © UFT 1993-2011 Version 1.35 from 22-03-2011

Bøjeklap, dimensionering 300 l/s



rating curve data

Index	W in mm	Q in l/s	W in m+NN
00	352	0	9.915
01	364	60	9.927
02	376	120	9.939
03	391	180	9.954
04	414	240	9.977
05	437	301	10.000
06	463	361	10.026
07	487	421	10.050
08	508	481	10.071

Bøjeklap, dimensionering, 500 l/s

program FluidBend, written by Merschdorf, checked by Dr. Wells, copyright © by UFT 2011.

This design procedure and the laboratory data involved are our protected property. It is prohibited to pass on data to any third party without our consent. Patents pending.

1 Input data

Design flow rate	Q_b	=	500.0	l/s
Nr. of flaps in parallel	n	=	1	pieces
Length of one flap with side shield	L_1	=	2.00	m
Water level at design flow rate	W_b	=	10.08	m+NN

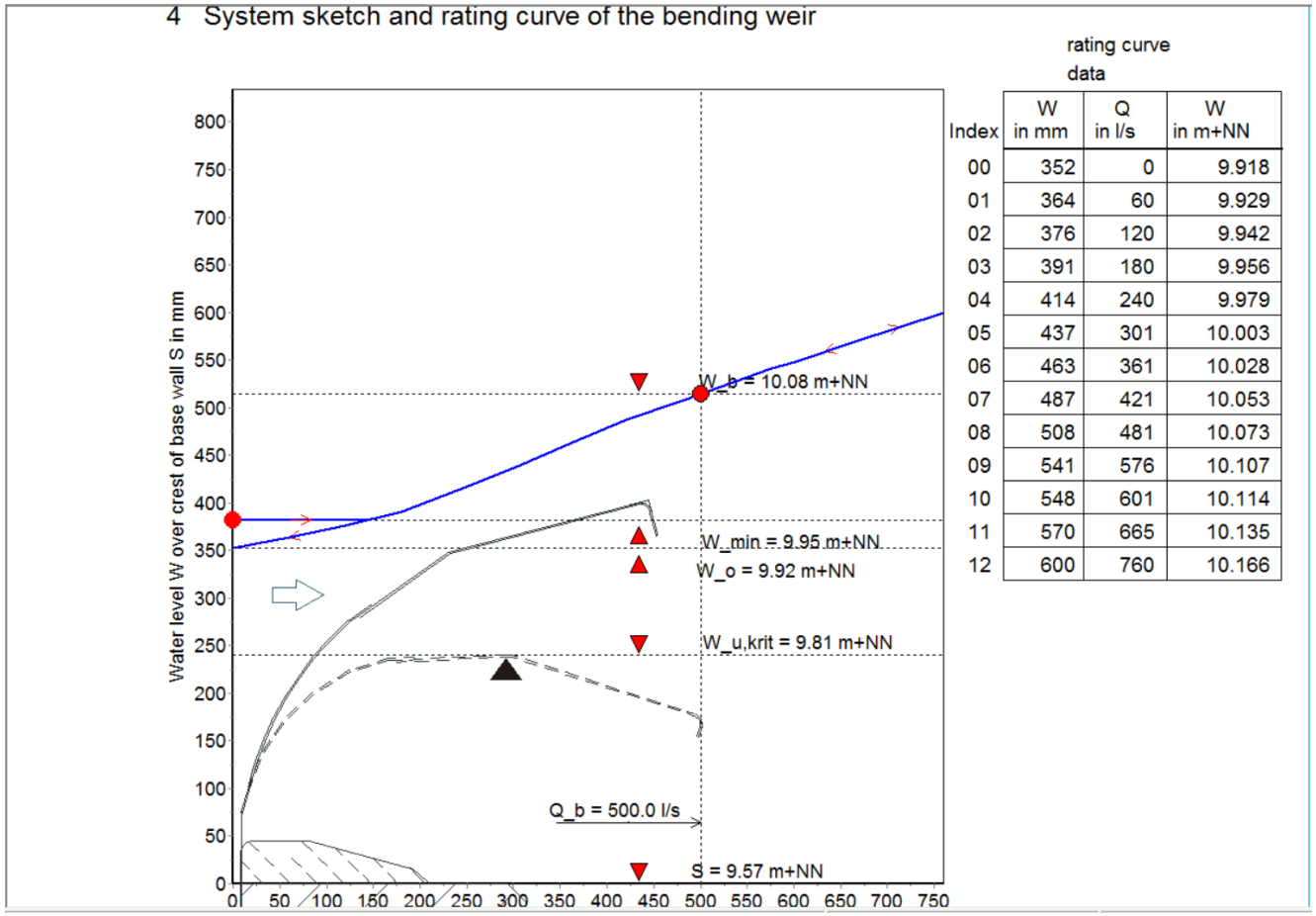
2 Device type selection

Size of UFT-*FluidBend*	Type	=	10	
Upper sealing for backflow protection		=	no	

3 Calculated data

Length of one flap without side shield	L	=	1.90	m
Water level at the beginning of overflow	W_{min}	=	9.95	m+NN
Water level at end of overflow	W_o	=	9.92	m+NN
Crest of base wall	S	=	9.57	m+NN
Max. admissible downstream water level without impairment of the hydraulic behaviour	$W_{u,krit}$	=	9.81	m+NN
Weir comparison ratio i.e. the bending flap has at W_b the same overflow Q_b as an about k times longer fixed weir.	k	=	1.999	dim. less

Bøjeklap, dimensionering, 500 l/s



rating curve data

Index	W in mm	Q in l/s	W in m+NN
00	352	0	9.918
01	364	60	9.929
02	376	120	9.942
03	391	180	9.956
04	414	240	9.979
05	437	301	10.003
06	463	361	10.028
07	487	421	10.053
08	508	481	10.073
09	541	576	10.107
10	548	601	10.114
11	570	665	10.135
12	600	760	10.166

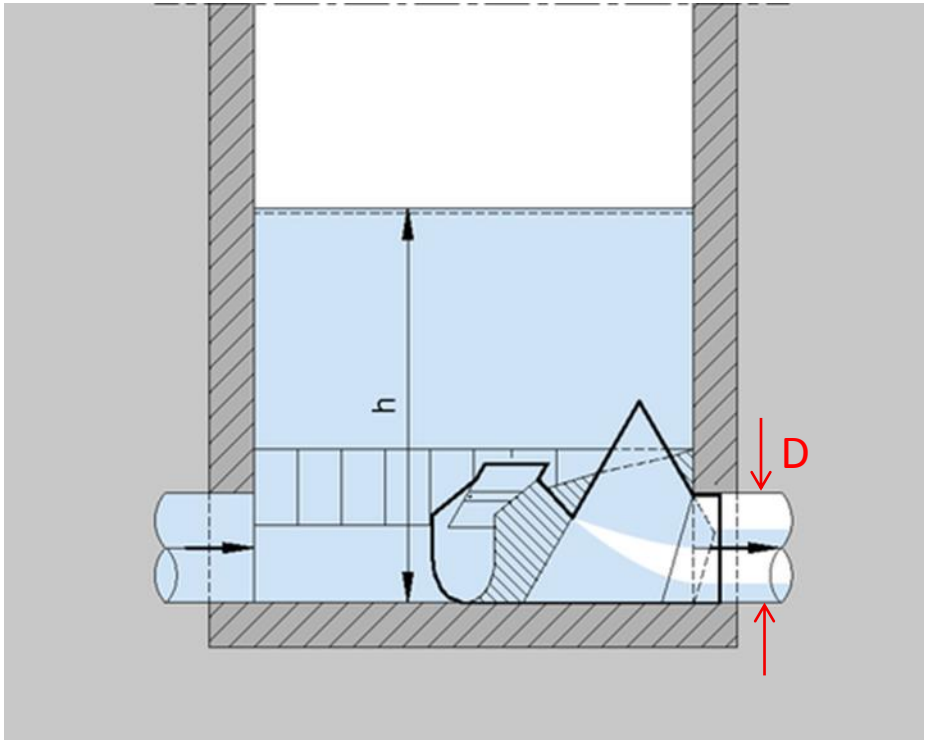
Bøjeklap, dimensionering

En bøjeklap kan tilnærmet modelleres som en 2-3 gange så lang fast kant, men faktoren afhænger af det dimensionsgivende flow.

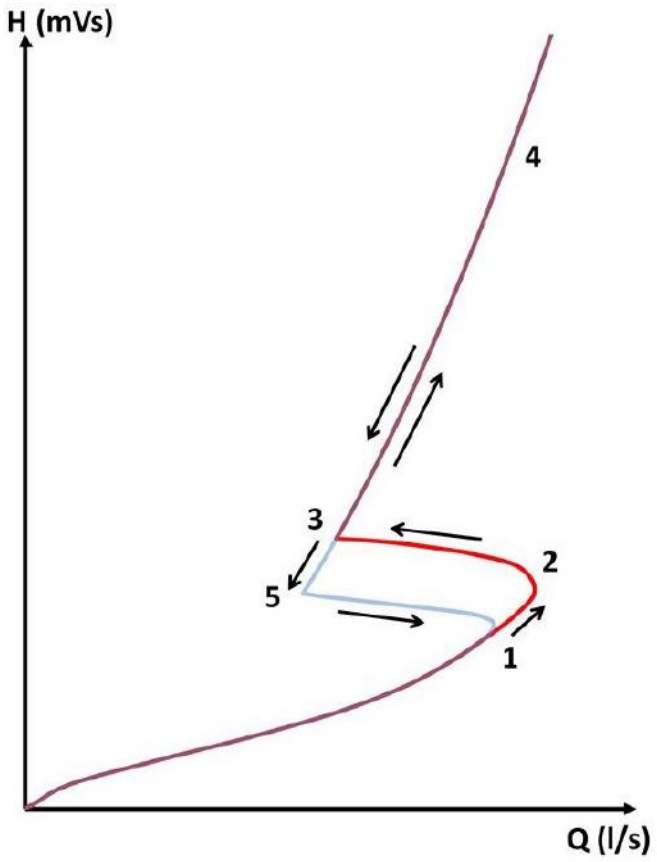
Q-H tabel er bedre, men kan ikke beskrive effekten af evt. tilbagestuvning.

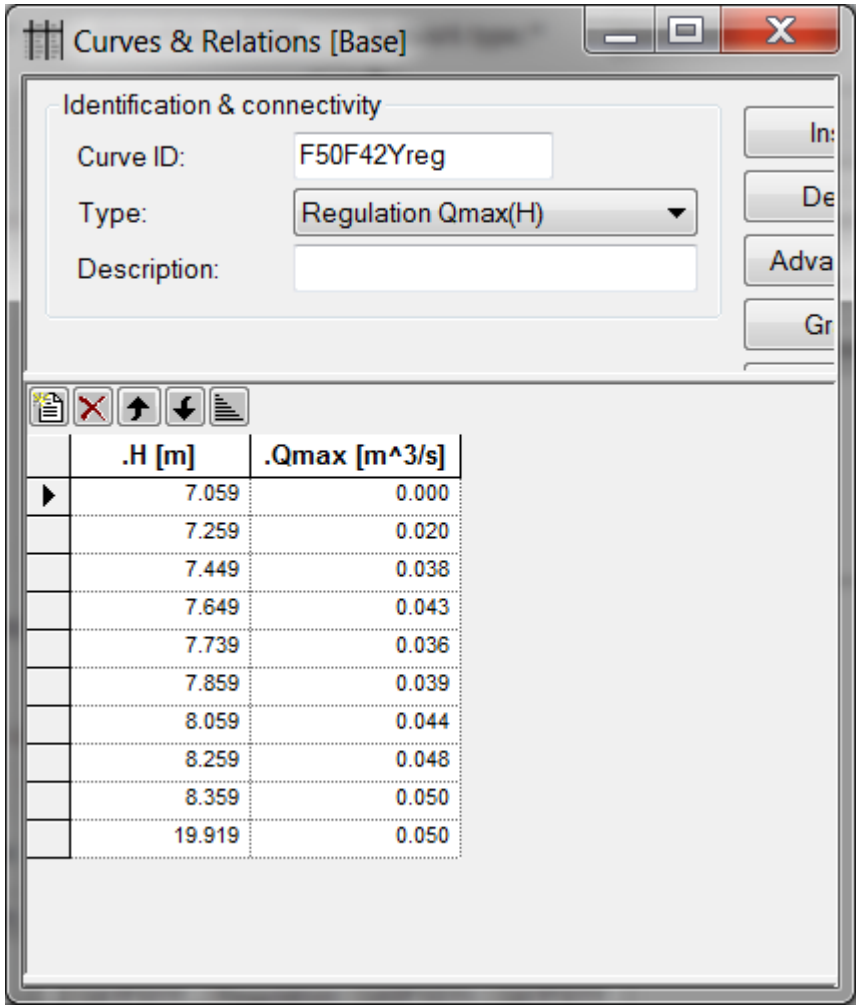
Samme konklusioner gælder for fjederklapper.

Vandbremser



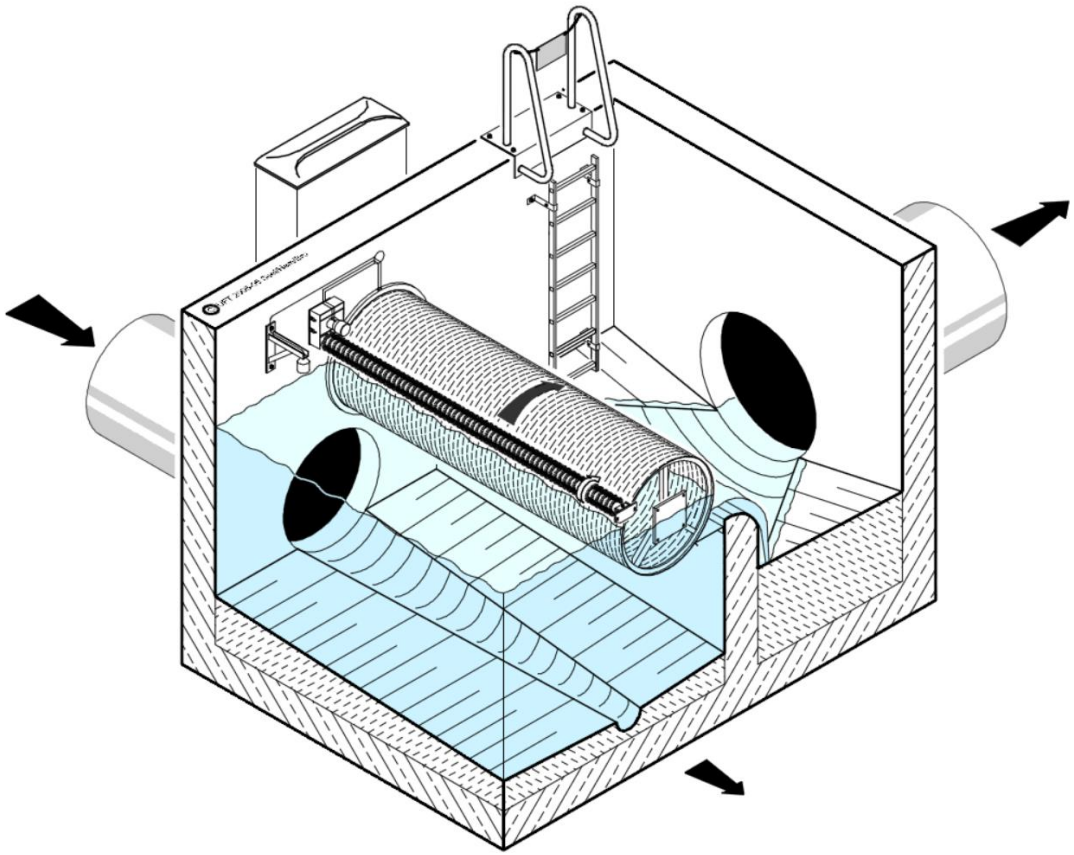
Vandbremser



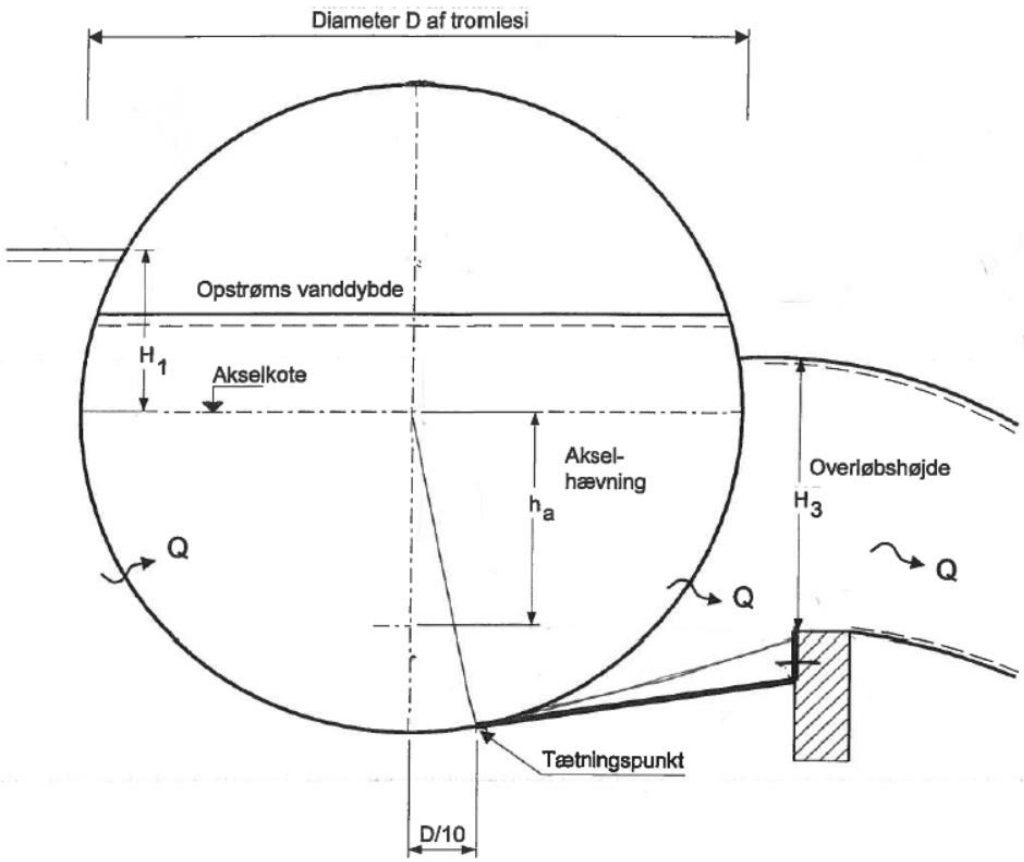


.H [m]	.Qmax [m^3/s]
7.059	0.000
7.259	0.020
7.449	0.038
7.649	0.043
7.739	0.036
7.859	0.039
8.059	0.044
8.259	0.048
8.359	0.050
19.919	0.050

Tromlesier



Tromlesier, snit



Tromlesier, specielle forhold

- Max 75% neddykning pga børsten
- Jo større akselhævning, jo større tryktab gennem sien men jo større kapacitet.
- Max anbefalet akselhævning 0,4*D
- Hvis tromlesien ikke roterer er den tilstoppet og vandet løber ovenover.

Tromlesier, modellering

Metode 1

- Som fast kant men med den halve længde
- Ved max. akselhævning (0,4*D) f.eks. kantlængde 0,4*L
- Ved min. akselhævning (0) f.eks. kantlængde 0,6*L

Metode 2

Få leverandøren til at levere en Q-H kurve, som indtastes.

Tak for jeres opmærksomhed.

Er der nogle spørgsmål?