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Chapter 3: **Planning requirements**

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3. Planning requirements

3.1 Basic data

General:

- Company site, production process, persons, capacity, future options
- Water consumption, waste water discharge (incl. quality)
- legal standards for direct or indirect discharge
- other legal informations
- internal measures
- economic informations with respect to wastewater treatment

Operational characteristics:

- names, adresses
- authority
- production data
  programme, schedule, employees
- future development

Water supply:

- type of supply
- drinking-, process-water
- water cycles
- water in the product etc.

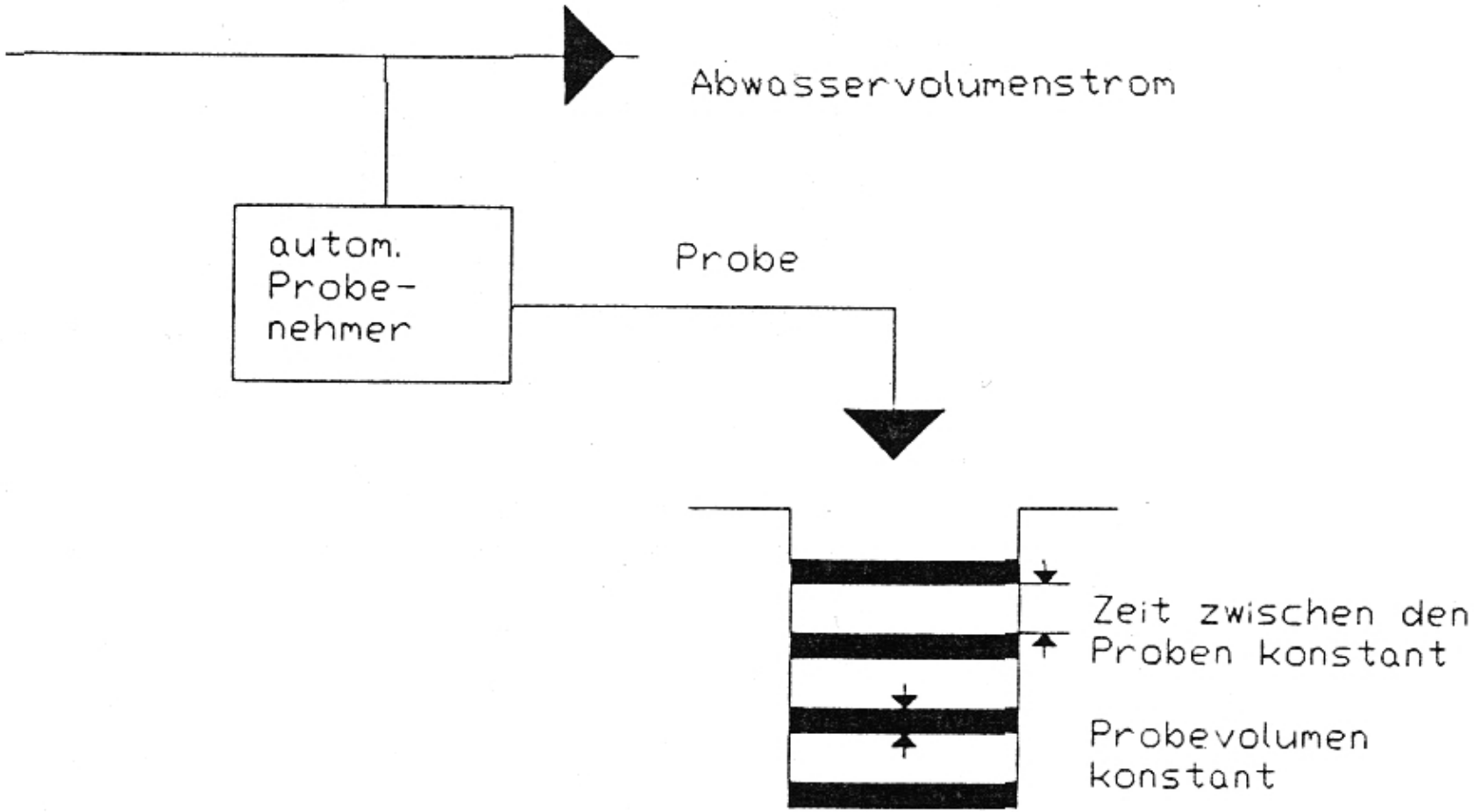
wastewater:

- quantity, quality
- separation of different wastewater flows
  cooling water, surface runoff, domestic wastewater,
  process-water (high/low loaded)
- parameters (COD, BOD5, pH, N, P, HM, Micropollutants,…)
- plan of sewerage
- fate of residues, e.g. sludge, valuable resources
- water protection zones

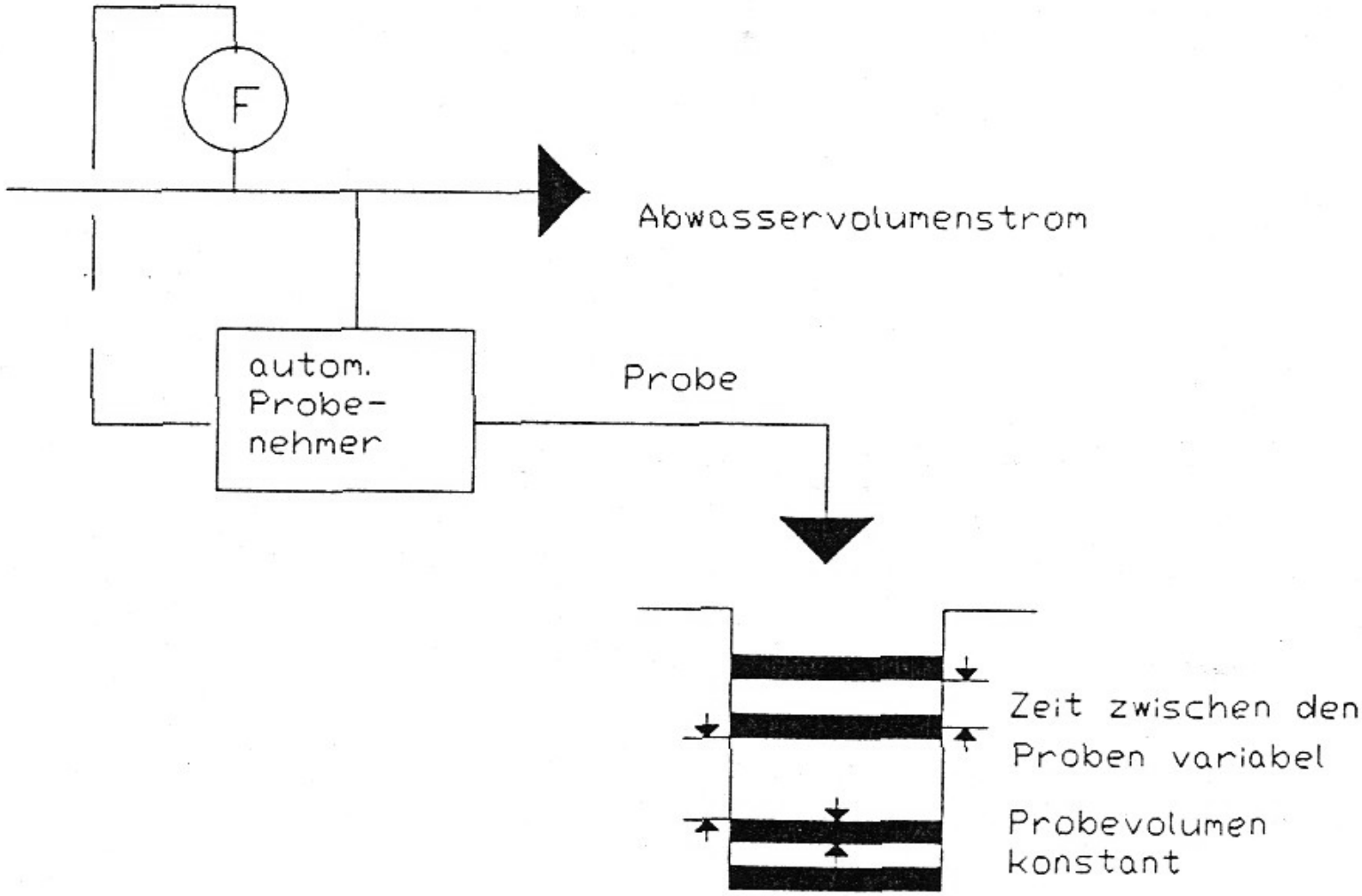
3.2 Sampling

- grab samples
- composite samples
  - time composite
  - flow proportioned composite
- sampling and analysis plan
- representative sampling (proper location)
- online analyzers

Time composite



Flow proportioned composite



- Conservation of samples

Suggested sample preservation and holding periods for selected parameters.[2]

Parameter	Preservative	Maximum holding period
BOD	Refrigeration at 4°C	6 hours
COD	2 mL H_2SO_4/L	7 days
Cyanide, total	NaOH to pH>12	24 hours
Metals, total	5 mL HNO_3/L	6 months
Metals, dissolved	3 mL 1 + 1 HNO_3/L filtrate	6 months
Ammonia nitrogen	40 mg $HgCl_2$/L at 4°C	7 days
Oil and grease	2 mL H_2SO_4/L at 4°C	24 days
pH	Determine on site	None
Phenols	1.0 g $CuSO_4$/L + H_3PO_4 to pH 4.0	24 hours
Solids	None	7 days
Sulfate	Refrigeration at 4°C	7 days
Sulfide	2 mL Zn acetate/L	7 days

Konservierungsmethoden

Parameter	Konservierung	Probebehältnis
Cyanid	NaOH-Lösung	Glas
Sulfide und Mercaptane	NaOH-Lösung	Glas
Phenole	ansäuern auf den pH-Wert 4 mit HNO_3 und Zugabe von $CuSO_4$	Braunglas PTFE
Schwermetalle	ansäuern auf den pH-Wert 1 mit HNO_3	Glas
Phosphor-verbindungen	ansäuern auf den pH-Wert 3–4 mit H_2SO_4	Glas, PE, PVC
AOX	ansäuern auf den pH-Wert 2 mit HNO_3 Zugabe von Na_2SO_3, wenn freie Chlorver-bindungen vorhanden	Glas mit Schliffstopfen
TOC	kühlen bei 4 °C oder einfrieren	Glas, PE
CSB	kühlen bei 4 °C oder einfrieren	Glas, PE
BSB5	einfrieren	PE

3.3 Flow measurement

Goals: Monitoring standards (legal requirements)
localisation of contamination sources
design purpose

for waiving fees

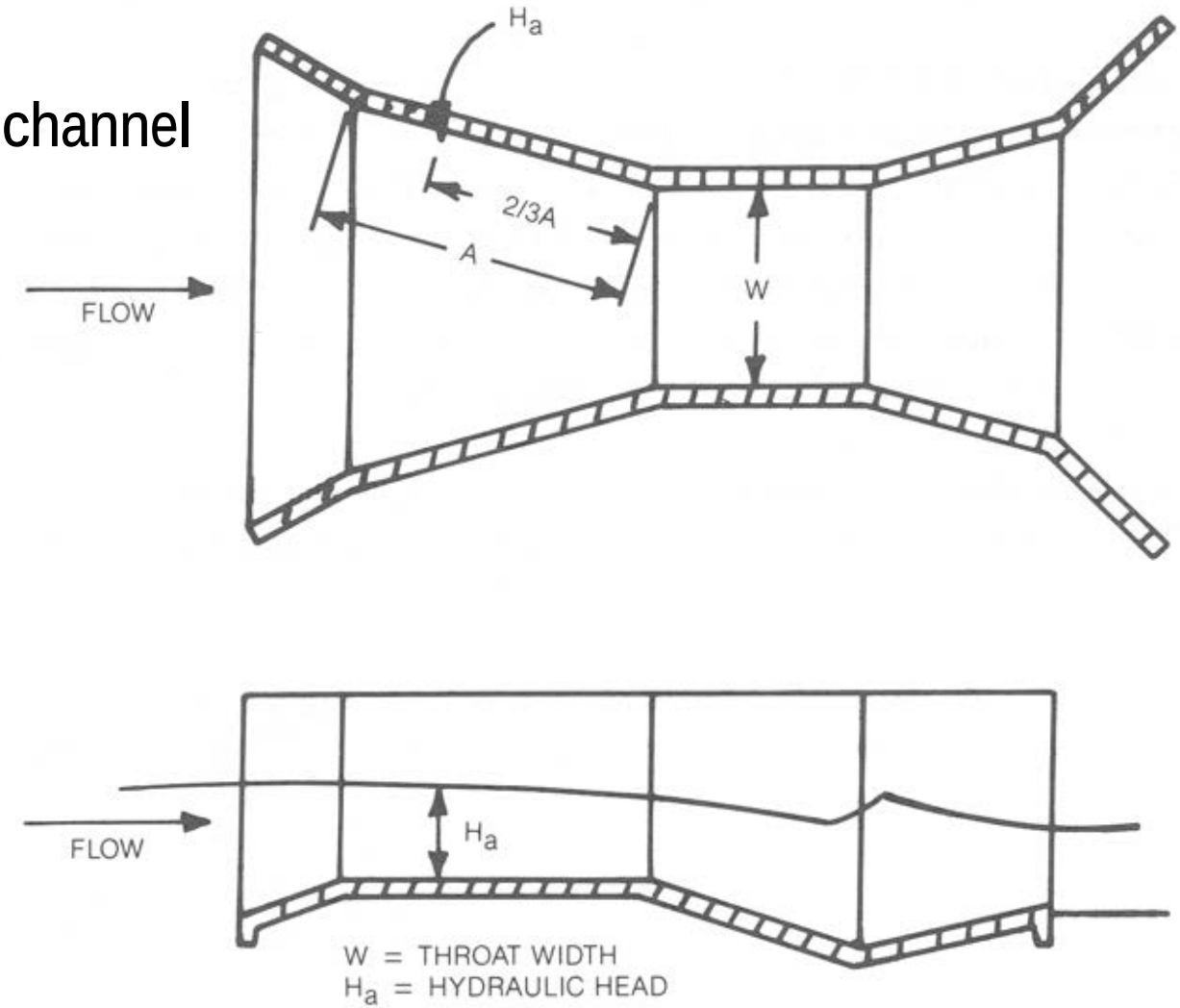
Theoretical Basics

Flow = dV/dt (volume/time)
characteristic parameters:
volume, time, velocity, cross sectional area
measurement categories:
water depth, velocity,

Methods

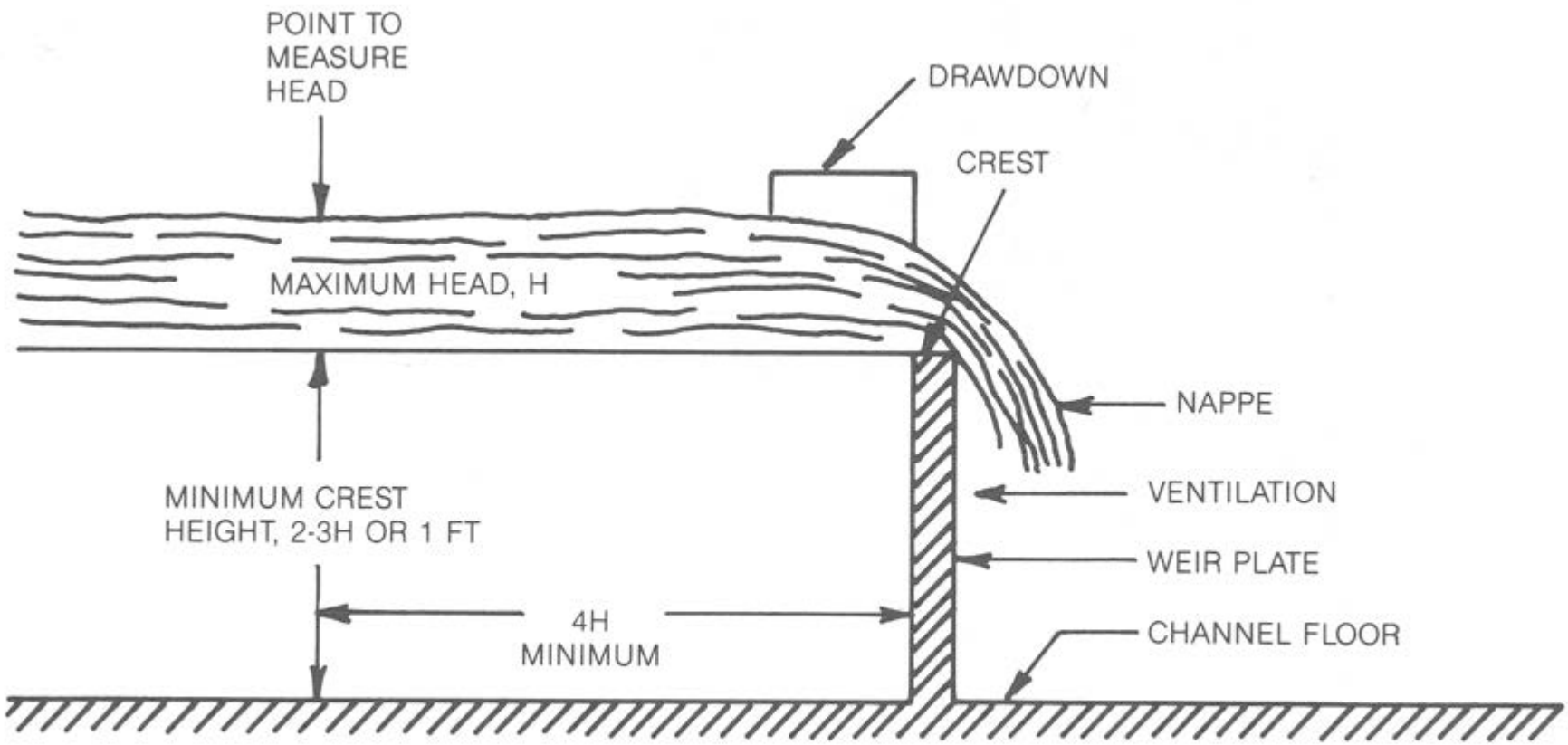
- hydraulical: weirs, flumes
- combined: velocity (magnetic-inductive, Ultrasonic-Doppler)
  pressure
- volumetric: volume, time (tank)
- tracer dilution: NaCl, LiCl, dye, radioactives

Open channel



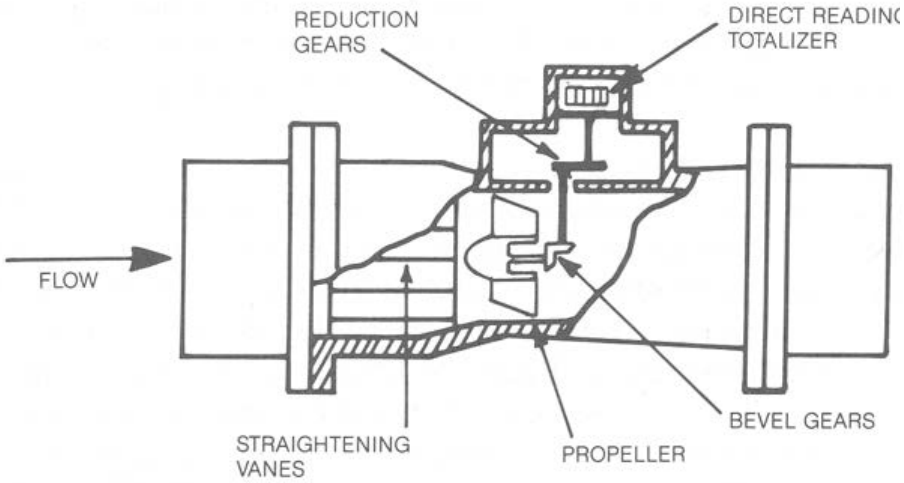
Parshall flume.[3]

Open channel

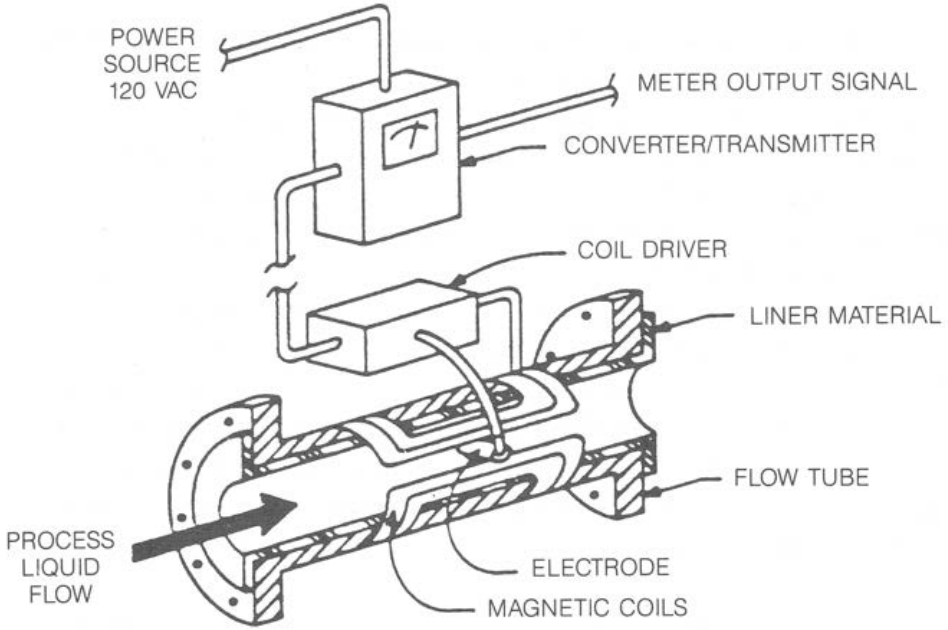


Typical weir: general elevation. (Note: ft. × .3048 = m)

Closed pipe flow

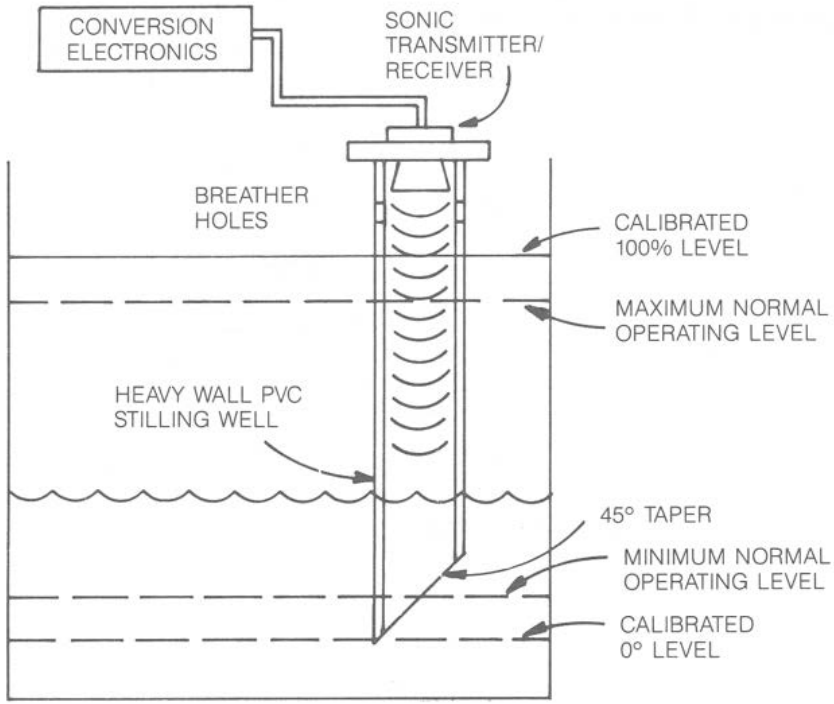


Propeller flow meter.

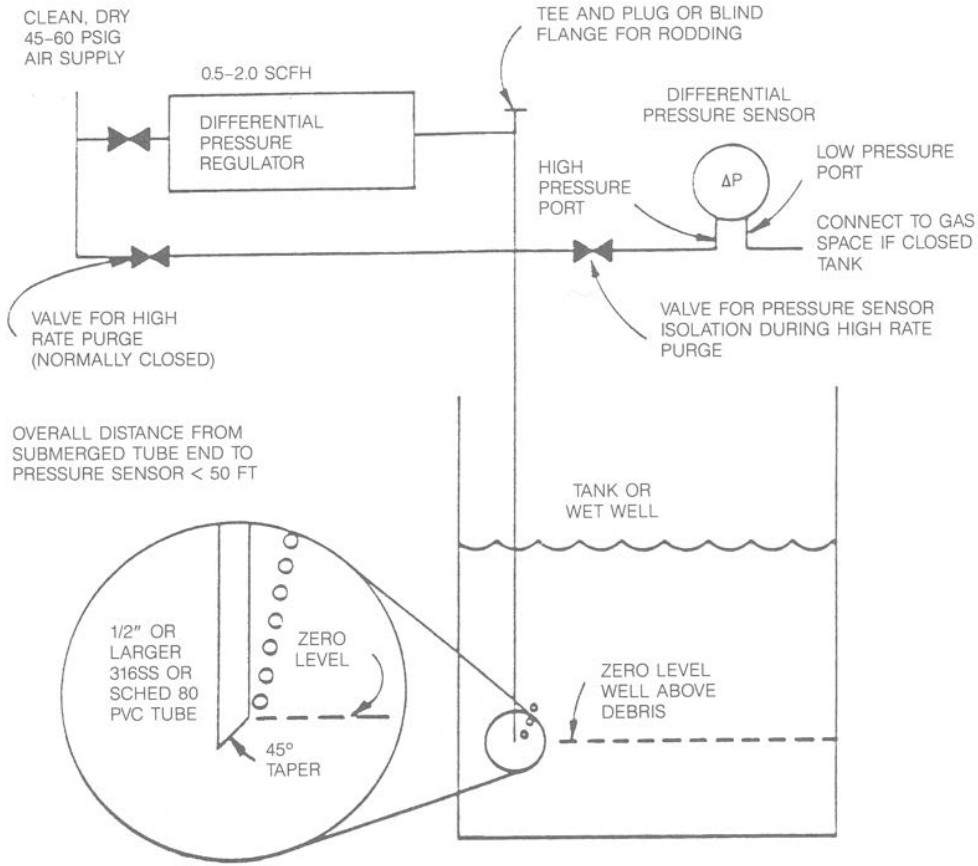


Magnetic flow meter.

Level measurement

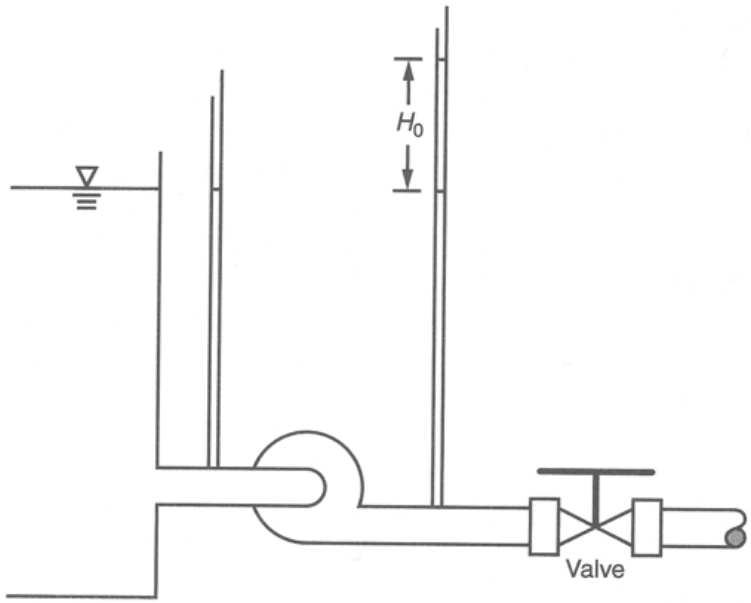


Acoustic level sensor installation.

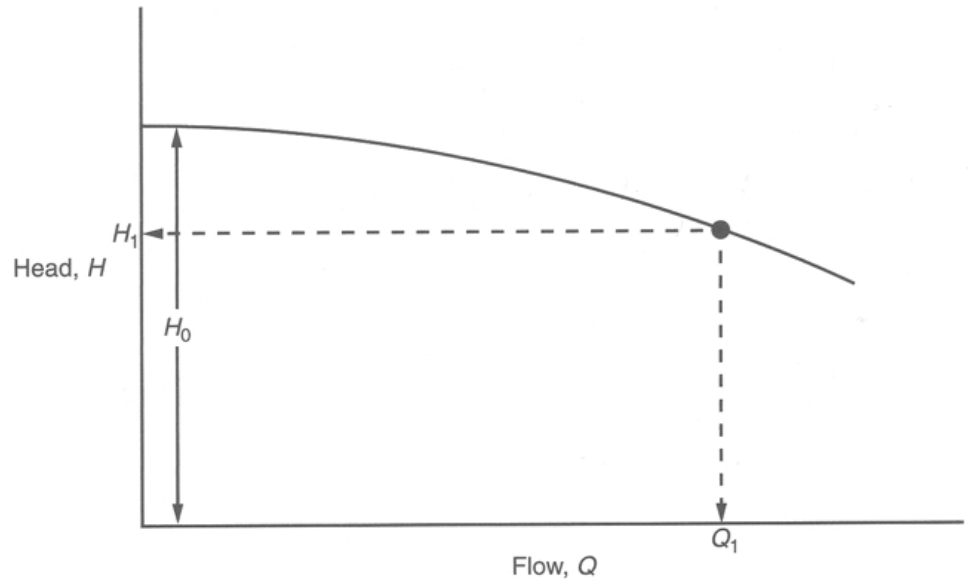


Schematic of bubbler-level system.

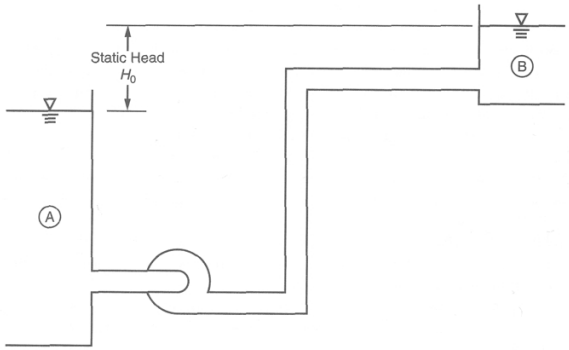
Pumping



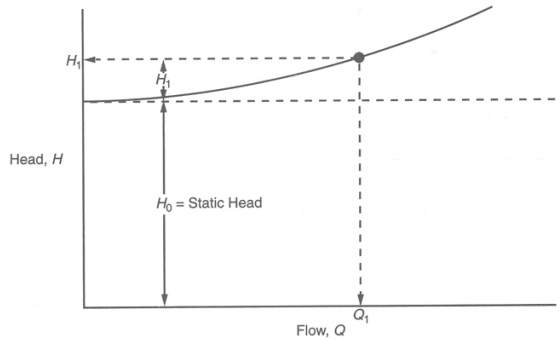
Pump setup for establishing its characteristic curve.



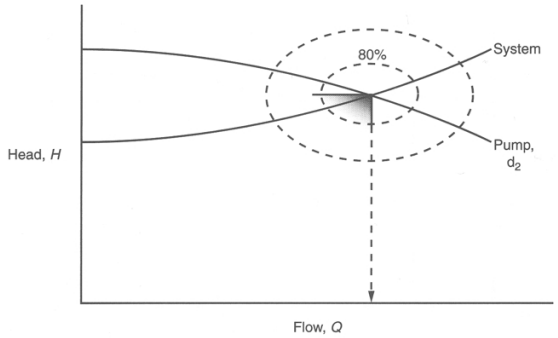
The pump characteristic curve.



Pumping from reservoir A to reservoir B.



System head curve.



System head curve superimposed on pump characteristic curves to determine operating point.

SUPPORT SYSTEMS

- Electrical Systems
- Instrumentation, Control
- Heating, Ventilation, Air
- Odor Control
- Chemical Systems