Typical Power House with Francis Turbine
Arrangement of a small hydropower plant

1. Intake dam
2. Gate
3. Trash rack
4. Emptying gate
5. Ice gate
6. Intake cone
7. Expansion stuffing box
8. Fundament
9. Turbine shaft
10. Turbine
11. Draft tube
12. Closing valve
13. Tail race canal

A. Water intake
B. Penstock
C. Turbine
Ligga Power Plant, Norrbotten, Sweden

\[ H = 39 \text{ m} \]
\[ Q = 513 \text{ m}^3/\text{s} \]
\[ P = 182 \text{ MW} \]
\[ D_{\text{runner}} = 7.5 \text{ m} \]
Types of Gates

- Radial Gates
- Wheel Gates
- Slide Gates
- Flap Gates
- Rubber Gates
Radial Gates at Älvkarleby, Sweden
Radial Gate

The forces acting on the arc will be transferred to the bearing
Slide Gate

Jhimruk Power Plant, Nepal
Flap Gate
Rubber gate

Reinforced rubber
Open position

Flow disturbance

Reinforced rubber
Closed position

Bracket

Air inlet
Circular gate

Jhimruk Power Plant, Nepal
Valves
Spherical valve
Butterfly valve
Hollow-jet Valve
Pelton turbines

- Large heads (from 100 meter to 1800 meter)
- Relatively small flow rate
- Maximum of 6 nozzles
- Good efficiency over a wide range
Jostedal, Norway

\*Q = 28.5 m³/s
\*H = 1130 m
\*P = 288 MW