

# 10 Dam Measurement

## Fill Dam Measurement

During construction of an earth dam, pore water pressure in the dam body and its foundation ground is measured and data obtained is used to control earth (concrete) filling speeds. Deformation of the dam body and its foundation and the earth pressure on them are also measured during construction. After completion of a dam, the amount of infiltrating water in the dam body and foundation ground and the deformation of the dam body are measured to ensure safe dam operations. In addition, pore water pressure, osmotic pressure on foundation ground, the level of groundwater and so on are measured in order to grasp the state of water infiltration in both the dam body and its foundation ground.

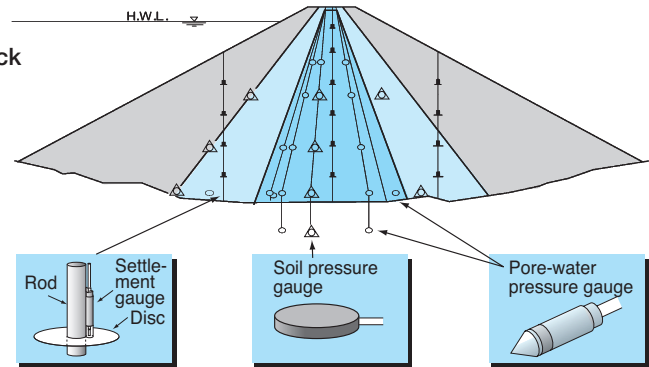
### A list of Measuring Instruments

Measurement for surrounding ground and foundation bedrock

| Items              | Instruments               | Type                                         |
|--------------------|---------------------------|----------------------------------------------|
| Slope failure      | Extensometer              | KLG-A, NKLG-A                                |
|                    | In-place inclinometer     | KB-AB, KB-AC, KB-JF, KB-KF<br>NKB-LD, NKB-MD |
| Ground water level | Water level meter         | KW-C                                         |
| Infiltration flow  | Pore-Water pressure gauge | KPA-PA, KPB-PA<br>KPC-PA, KPD-PA             |

Measurement for embankment and foundation

| Items                        | Instruments                  | Type                          |
|------------------------------|------------------------------|-------------------------------|
| Displacement                 | Inclinometer                 | KB-JE, KB-KE                  |
| Subsidence of soil layer     | Settlement transducer        | KLA-A, NKLA-A, KLC-A          |
| Displacement of bedrock      | Rock displacement transducer | KLB-A                         |
| Displacement of rock surface | Inclinometer                 | KB-DB, KB-DE, KJB-A           |
|                              |                              | KB-AB/-AC/-DB/-EB, NKB-LD/-MD |
| Settlement                   | Settlement meter             | Made to order                 |
| Pore-water pressure          | Pore-water pressure gauge    | KPA-/KPB-/KPC-/KPD-PA         |
| Soil pressure                | Soil pressure gauge          | KDA-PA, KDC-PA, KDE-PA        |
| Strain                       | Strain transducer            | KM-B                          |



Measurement for inspection gallery

| Items                                   | Instruments                            | Type               |
|-----------------------------------------|----------------------------------------|--------------------|
| Stress of bar                           | Reinforcing bar meter                  | KSAT-A, KSA-A      |
| Relative displacement between concretes | Joint meter                            | KJA-A              |
| Concrete Stress                         | Concrete Stress meter                  | Made to order      |
| Internal strain                         | Strain transducer<br>Non-stress casing | KM-B, KM-BT<br>KMF |
| Temperature                             | Thermocouple<br>Temperature gauge      | T<br>KT-A          |

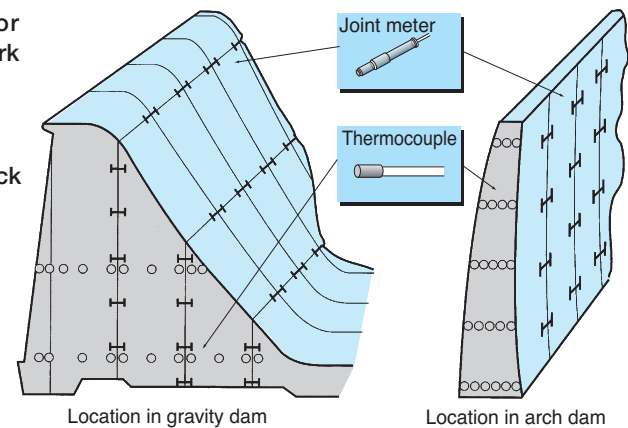
## Concrete Dam Measurement

Embedment instruments for concrete dam are used for roughly three purposes: construction work management, work safety management and collection of research data.

### A list of Measuring Instruments

Measurement for surrounding ground and foundation bedrock

| Items                   | Instruments               | Type                                           |
|-------------------------|---------------------------|------------------------------------------------|
| Slope failure           | Extensometer              | KLG-A/-B, NKLG-A/-B                            |
|                         | In-place Inclinometer     | KB-AB, KB-AC<br>KB-JF, KB-KF<br>NKB-LD, NKB-MD |
| Underground water level | Water level meter         | KW-C                                           |
| Infiltration flow       | Pore-water pressure gauge | KPA-PA, KPB-PA<br>KPC-PA, KPD-PA               |



Measurement for embankment

| Items           | Instruments                      | Type          |
|-----------------|----------------------------------|---------------|
| Leakage         | Triangular-weir water meter      | Made to order |
| Concrete stress | Stress meter                     | Other maker   |
|                 | Strain transducer                | KM-BT         |
|                 | Non-stress casing                | KM-BT, KMF    |
|                 | Joint meter                      | KJB-A         |
| Temperature     | Temperature gauge (Thermocouple) | KT-A<br>T     |
| Deformation     | Plumb line                       | Other maker   |

Measurement for foundation

| Items                   | Instruments                  | Type                             |
|-------------------------|------------------------------|----------------------------------|
| Displacement of bedrock | Rock displacement transducer | KLB-A                            |
| Pore water pressure     | Pore water pressure gauge    | KPA-PA, KPB-PA<br>KPC-PA, KPD-PA |
| Soil pressure           | Soil pressure gauge          | KDA-PA, KDC-PA<br>KDE-PA         |
| Uplift pressure         | Uplift pressure transducer   | PUF-S                            |