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Good afternoon & Welcome to you all …

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Concrete/masonry water retaining Structures are Designed and Build to:-

1) Contain Water within it reservoir.
2) Maintain Dry Conditions within the Structure When it is subjected to watery condition on outside.

Hirakud DAM Odisha

Clywedog, Wales, UK
Water retaining Concrete/ masonry Structures like DAM, Barrages, Aqueduct are often get damaged which are mainly caused by :-

- High Flowing Water Velocity as high as 40 m/sec or more. Eddy currents from water flow
- Impact from Moving debris of high volume
- Erosion and Cavitation caused by silt.
- Crack developed in body of Dam due to movement.
- Damages of Concrete through aggressive chemical contamination in flowing water. Eg, ASR
- Damaged caused by Natural calamity, EQ, Flash Floods.

Each problem needs to be inspected and addressed separately as the treatment may be different for each problem.
Repair Techniques of Water Retaining Structures By PU Resins.

Repair or any Treatment may be needed in a water retaining structure either on the positive or negative side:-

- Positive side barrier systems are placed on the water side i.e. under water.
- Negative side barrier systems are placed on the side Opposite to the applied Hydrostatic Pressure i.e from Downside in dry or wet condition.

  - Restricted working hours as per international diving norms.
  - Work has to be done through skilled divers, so needs proper training for diver.
  - Repair materials used in air often completely unsuitable for Underwater repair.
  - However, many methods & Techniques available for above water repair can be used for underwater with necessary modifications.
Major effects that underwater working has on repair operations are:-

- Cost & Difficulty of underwater workings.
- Method of repair must suit local conditions.
- Appropriate tools, equipment for safe use in underwater.
- Preliminary works like Surface preparation, patching, form work etc.
- Materials selection & testing to ensure ease of application,
- Bonding with substrate, compatibility with UW placing.
- Material curing as many resin based formulation are not suitable for UW use
- Method of placement, workmanship so as to minimize mixing of repair materials with water.
- Cost involved in Pre Inspection of distress and post inspection after repair completed to check the success of UW repair.
Why to do repair:
Such UW repair become essential in water retaining structure for:
- solving problems like water leakages, crack repair, joint treatment
- to prevent further deterioration
- to bring the structural safety and
- for increasing its service life.
Some times it is necessary to upgrade certain facilities to enable some change in use of the structure.

Basic objective of such repair is to:
- Restore Durability
  - Structural strength
    - solving any problem like water leakages.
    - Also Its Function & to bring appearance as per original
Application of PU resins in Water Retaining Structures for repair and water ingress control
Shafts Repair by Injection
There are many points to look at before the correct resin can be selected for specialist grouting works. Some of these are:

- Does the repair have to be structural or is it just to stop the water?
- Is the structure moving (thermal or structural)?
- What is the degree of water ingress?
- Will the structure dry out?
- What type of injection equipment is available or can be used at site?
- Are there time constraints on the project?
- What are the end requirements of the client?

The above are the basic points which have to be considered before any proposal is given.
There is a wide selection of chemical and cement based grouts available for use for water control and ground treatment applications. Chemical grouts are solutions as opposed to particulates (such as cement based grouts), which are particles held in solution (particulate).

Chemical grouts typically include:
- Single and dual component polyurethane resins
- Hybrid silicate polyurethanes
- Acrylate Gels
- Sodium Silicate (waterglass)
- Colloidal Silica

There is also a wide selection of microfine and ultrafine cement and slag based grouts available.
Repair Techniques of Water Retaining Structures By PU Resins.

Normet Grout Range (MAKE IN INDIA)

- Microfine and Ultrafine
- Acrylates
- Colloidal Silica
- Two Component Foams
- Hybrid Resins
- Single Component Foams
Tam Pur 116T – Silicon Modified PU

Unique properties

- No water reactivity – underwater repair works on concrete
- Environmentaly safe
- Non-toxic when cured
- Flame retardant foams without toxic chemicals
- Fire proof solid materials without toxic chemicals
- Long shelf life
- 50% mineral – unlimited resources
- Saving fossile resources

Urea-Silicates
cure even under water
without
volume expansion

Reaction Temp up to 100° C
Silicate Modified non foaming PU Resin is water insensitive and can be used for Block, cavity filling under water.

TamPur 116T (solid rock and concrete repair adhesive for underwater application even): Test for Antiwashout property and Bond under direct...
Repair Techniques of Water Retaining Structures By PU Resins

RESIN PUMP SYSTEMS

Pneumatic twin piston

Electric diaphragm pump

Mixing head assembly
Repair Techniques of Water Retaining Structures By PU Resins.

PACKER SYSTEMS & EQUIPMENT

C - open packer

GX - packer

GU / CU reusable packers

High pressure  Low pressure

Mechanical mounting with wrench and safety hook

Mechanical mounting with wrench

High pressure and safety hook

Compression pipe for wrench with safety hook. Packer and injector mounted.

Manual mounting

Mechanical mounting with wrench
Conclusion:-
• For under water repair of retaining structures many materials are available now.
• Normet Has Complete Injection system for UW repair of DAM.
• All PU, Acrylate Injections resins are produced in India by Normet.
• So users can have better inventory control and affordable price.
• Product can be modified for any specific need at site by Normet Scientist.
• Normet has PU Pump, Packers, and Expert support by Engrs. at Job site.
• So far many prestigious job has been successfully executed by Normet team.

Thanks for your attention………

Any Question is welcome.