

### GENERAL DESCRIPTION

**AXEL QUARTZITE 403** is designed as a admixture for concrete to improve its performance and durability. **AXEL QUARTZITE 403** consists of ultra-fine amorphous mineral powder which is nearly spherical particles around 100 times smaller than a grain of cement, and active, proprietary chemicals.

Ultrafine properties of **AXEL QUARTZITE 403** make concrete more dense by filling up the fine voids which exist between the cement or aggregates matrix. Meanwhile the active chemicals form a chemical reaction with cementitious materials in concrete to generate crystals that help to fill capillary pores and seal micro-cracks in the concrete.

**AXEL QUARTZITE 403** also used in sulphate resistant marine concrete structure against chloride diffusion or corrosion control.

### RECOMMENDED USES

Use as an additive with standard OPC in concrete structures such as:

- \* Bridges
- \* Sewage plants
- \* Reservoirs
- \* Basements
- \* Damps
- \* Concrete platforms
- \* Water treatment plants
- \* Retaining structures
- \* Parking pits

### CHARACTERISTICS & ADVANTAGES

- \* Cost effective when compared to alternative methods for enhancing the durability of concrete
- \* Added to the concrete at the time of batching and therefore not subject to climatic restraints
- \* Increases strength and reduces water permeability
- \* Reduce penetration of salts such as chloride into the concrete
- \* Promotes resistance against chemical attack
- \* Prevent surface peeling due to sulphate attack

### COVERAGE

20 kg/m<sup>3</sup> concrete for normal application

### PACKING

20 kg per bag

### STORAGE

Store in a dry, cool and shaded place

## QUARTZITE 403

Amorphous Mineral Waterproofing

### METHOD OF APPLICATION

- \* **AXEL QUARTZITE 403** is dosed into ready mix truck mixer at site at 1 bag/m<sup>3</sup> concrete.
- \* Mixing for 10 minutes after the addition of Quartzite 403 to ensure a uniform distribution of admixture in concrete mixture.
- \* The concrete is laid to required level with proper jointing and supervision of vibration.

### **Notes:**

- \* **AXEL QUARTZITE 403** is compatible with most concrete materials or admixtures e.g. cement, water reducing agent, silica sand.
- \* **AXEL QUARTZITE 403** has little or no effect on workability and setting time of concrete within the recommended dosage rate. However, a prior site mix is recommended to carry out for assess the effect.
- \* Add **AXEL QUARTZITE 403** powder to wet mixed concrete without a thoroughly mixing may cause clumping and thorough dispersion will not occur. Well-mixing of admixture in concrete mixture is important for optimum product's performance. Ensure **AXEL QUARTZITE 403** is mixed homogeneously in concrete mixture before installation
- \* Consult safety data sheet (SDS) or refer to the packaging for safety use and precautions instruction.
- \* Contact Axel Technical Service Department for additional information or special performance characteristics on this product.

### TECHNICAL SPECIFICATIONS

Appearance	Ultrafine powder
Specific gravity	2-2.4 kg/cm <sup>3</sup>
Toxicity	Non-toxic

### Crystallization Properties

- \* Digital microscope scanning at 1000X magnifications



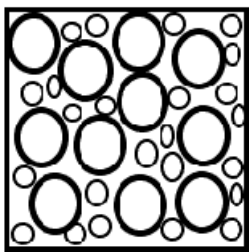
Crystalline formation

**AXEL QUARTZITE 403** contains special active chemical which reacts with the by-products of cement hydration like calcium hydroxide, sulphates and carbonates of sodium potassium, allow a chemical reaction takes place to form insoluble crystals in the presence of moisture.

As long as moisture remain present, these long, needle like crystals will continue grow in the concrete. With this continuous crystallization mechanism, pores, capillaries, voids and micro-cracks in concrete will be blocked out. In the absence of moisture, it will remain inactive until additional water enters through new crack causes the crystallization begins again. The crystalline formation also improves the self-sealing properties of concrete up to 0.4mm.

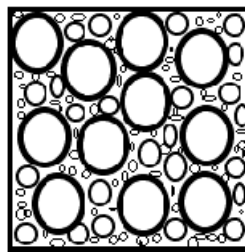
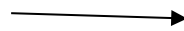
### Compressive Strength

**AXEL QUARTZITE 403** is an ultrafine particle powder and add into concrete to fill up the pores among cement and aggregates. The denseness of concrete increases by voids get reduced and enhances the concrete's strength. Besides of its fine particle size properties, chemical reaction of **AXEL QUARTZITE 403** with by-products of cement hydration form crystalline materials also fill the voids in concrete thus improve the concrete's strength.



Cement +

+ Axel Quartzite  
403



Dense concrete

\* BS EN 12390-Part 3:2009 Testing hardened concrete. Compressive strength of test specimens.

Concrete cube samples treated with 1 % of **AXEL QUARTZITE 403** were tested for compressive strength at 28 days compared against control samples. Samples containing **AXEL QUARTZITE 403** can achieved compressive strength up to 55 Mpa meanwhile 44 Mpa strength achieved by control samples. It was 22% increase in strength compared to controls.

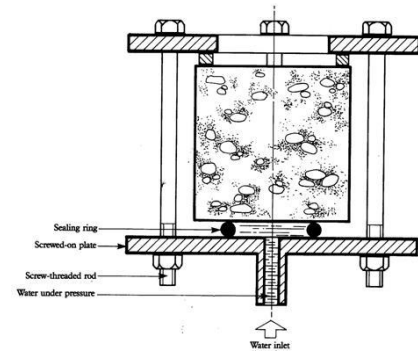
### Water Permeability

Porosity influences the permeability of concrete. Lesser the pores, lower the water permeability. With the ultrafine particles and crystalline properties of **AXEL QUARTZITE 403**, concrete pores are significantly reduced thus lower down the water permeability of concrete, become more durable and waterproofing.

\* **BS EN 12390-8: 2009 Testing Hardened Concrete Part 8: Depth of penetration of water under pressure, SIRIM QAS International Sdn Bhd, Malaysia.**

A permeability test was conducted to give a measure of the resistance of concrete against the penetration of water exerting pressure. Concrete samples containing Axel Quartzite 403 showed a result of 5mm depth penetration under water pressure of  $500 \pm 50$  kPa for  $72 \pm 2$  hours and did not show any leakage or visible defects during test period.

According to Concrete Society "Permeability Testing of Site Concrete", the maximum allowable depths for water penetration to consider to be under LOW concrete permeability or absorption is less than 30 mm, penetration depth of 30 – 60 mm under an AVERGAE level, more than 60 mm under HIGH level.



### Concrete Durability

Concrete deterioration can be due to several reasons. The corrosion of reinforcing steel is the leading cause of deterioration in concrete. When steel corrodes, the formation of rust occupies a greater volume than steel. This expansion creates tensile stresses in the concrete, which eventually cause cracking, delamination and spalling.

Exposure of reinforced concrete to chloride ions is the primary cause of premature corrosion of steel reinforcement. Chlorides dissolved in water and permeate through sound concrete or reach the steel through cracks, cause steel corrosion with the presence of oxygen and moisture.

With crystalline formation and self-sealing of **AXEL QUARTZITE 403** in concrete, penetration rate of chlorides significantly reduced and thereby prolong the concrete lifespan.

### Drinking Water Exposure

\* **MS1583:Part1:2003 Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water, SIRIM QAS International Sdn Bhd, Malaysia.**

A cytotoxicity test to test leachates from **AXEL QUARTZITE 403** for biologically active compound was carried out according to MS1583. Leachates from Quartzite 403 after 24 hour extraction at  $23 \pm 2^\circ\text{C}$  was used to prepare growth medium. The morphology of a mammalian cell line following a 24 hour culture in growth medium was observed.

Results showed that **AXEL QUARTZITE 403** exhibited no cytotoxicity response under the conditions of this test.

\* **Registered under Suruhanjaya Perkhidmatan Air Negara (SPAN), Malaysia.**

**AXEL QUARTZITE 403** was certified by SPAN to be used in the water services industry in Peninsular Malaysia and Federal Territory of Putrajaya and Labuan.

### **CLEANING OF TOOLS**

Clean all tools and application equipment with water immediately after use. Hardened and or cured material can only be mechanically removed.

### **SHELF LIFE**

12 months from the date of production if stored properly in original, unopened and undamaged sealed packaging in dry conditions.

The above data is provided in good faith and to the best of our knowledge. However, since application and services conditions are beyond our control, we do not accept liability relating to coverage, performance and injury arising from the use of our products based on the data. Further with the constant advancement of technology we reserve the right to modify data without prior notice and we advise that you check with our Axel Chemie Technical Department at Tel: 603-6276 2118 or 603-6276 6277 the validity of these data especially if more than six months have lapsed since issue.