

## **SECTION 615**

### **ARMOUR STONE**

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#### **615.01 SCOPE**

This specification covers the requirements for the supply of armour stone of various minimum sizes and minimum weights, together with the preparation of a foundation seat for the base of the armour stone treatment and the placing of the armour stones to a thickness not less than that stated on the Unit Price Table for the type of armour stone under construction.

#### **615.02 MATERIALS**

Armour stone shall be rock that is clean, hard, sound, durable, resistant to weathering and degradation in water, free of overburden, spoil, shale and organic material and having a density of not less than 2.6 tonnes per cubic metre. The rock material if subjected to the Los Angeles Abrasion Test (ASTM C131) shall have a loss not greater than 35%. When tested for soundness, five cycles of magnesium sulphate, ASTM C88, the rock material shall have a loss not greater than 15%.

Armour stones shall be of an angular shape, and be of a uniform gradation. The greatest dimension of any stone shall not exceed two (2.0) times the least dimension.

Rock with visible planes of weakness and/or subject to marked deterioration by water or weather will not be accepted.

Individual armour stones shall be of a weight, or of a volume that is not less than that specified in the contract item in the Unit Price Table. Unless otherwise stated, the

minimum armour stone dimension in any given direction shall not be less than 0.75 metres.

The acceptability of the rock shall be determined by the Owner's Representative and/or by laboratory and/or field testing procedures carried out by qualified personnel.

The approval of some rock fragments does not convey the Owner's Representative's approval of all rock fragments to be obtained at that quarry.

Armour stones shall be supplied by the Contractor.

### **615.03 PLACING**

Armour stones shall be placed to the satisfaction of and within the limits required by the Owner's Representative.

The Contractor shall complete any and all work required to provide access to all areas of the work site necessary to complete the preparation of foundation and placement of armour stone.

The Contractor shall prepare a foundation for the armour stone by excavating a seat in the existing ground.

Excavation shall be by means of a backhoe, or a clam as required, to carry out the excavation for the seat at the required location and to sufficient depth to provide a proper footing for the armour stone.

Excavation shall include any additional excavation required at the toe of slope to adequately prepare the armour stone footing.

The Contractor shall maintain the grades and slopes of the underlying material to ensure that the work area is cleared of all driftwood, debris, snow, ice and all other objectionable materials in the area of work.

Stones shall be placed by a crane, or similar equipment, starting at the bottom of the slope and working upwards.

The Contractor shall place the armour stone protection such that the underlying materials and any abutting Structures are not damaged. The Contractor shall be responsible at their own expense to repair any such damage to the Work.

No pushing or dumping of the stones by bulldozers or other equipment will be allowed.

The Contractor shall choose the stones and place them in such a way that the whole structure will be bound and consolidated to as great an extent as the nature of the rock will allow. Placing shall be done in such a manner that the surface of the armour stone treated slope shall have a uniform appearance. The thickness of the treated slope shall not be less than that specified in the contract item on the Unit Price Table.

Care shall be taken by the Contractor to ensure that no stones are placed outside of the lines as staked by the Owner's Representative.

If any armour stones are placed outside of the area to be treated or are washed out of place during construction, then they shall be removed or replaced by the Contractor at their own expense.

The Contractor shall be responsible for any Work or materials required to repair damage which is a result of water level variations, waves or weather conditions.

#### **615.04 MEASUREMENT FOR PAYMENT**

Stones placed outside of the limits required by the Owner's Representative will not be included in measurement for payment.

##### **615.04.01 Measurement for Payment by Volume**

For armour stone for which the contract unit price is stated in terms of the price per cubic metre, then such armour stone shall be measured for payment in terms of the net nominal volume of the armour stone treated slope comprising armour stone of the size in question. This net nominal volume shall be computed in cubic metres rounded to one decimal place.

The net nominal volume of the armour stone treated slope shall be calculated as the product of: the net surface area of the armour stone treated slope, times the nominal thickness of the armour stone treated slope, as specified in the contract item.

The net surface area of the armour stone treated slope shall be defined as the net area given by the mean length of the armour stone treated slope, times the mean width of the armour stone treated slope, measured along the face of the slope; less the area of objects around which the armour stone is placed.

#### **615.04.02 Measurement for Payment by Weight**

For armour stone for which the contract unit price is stated in terms of the price per tonne, then such armour stone shall be measured for payment by weighing the stones which are to comprise the treated slope. The weighing of materials shall be in accordance with the requirements of Section 501. Only loads certified by the Department personnel as being placed in the works shall be included in the measurement for payment. The weight shall be computed in tonnes, rounded to one decimal place.

Only armour stones certified as being placed within the limits, as staked by the Owner's Representative, will be included in measurement for payment.

#### **615.05 BASIS OF PAYMENT**

Payment at the contract unit price per cubic metre, or per tonne, for the size of armour stone specified, shall be compensation in full for all labour, materials, and equipment-use: to supply the required armour stones, to excavate a foundation seat for the bottom armour stones, to provide all haulage to transport the armour stones from the source to the place where the stones are to be placed, to complete all work required to access all areas of the work site, to place the armour stones, together with the provision for weighing (if applicable).