Bowers Brothers' Retaining

GUIDE TO PRODUCT EXPECTATIONS & RECOMMENDATIONS

ISSUE	EXPECTATIONS & RECOMMENDATIONS	EXPECTED	REPLACEABLE
Concave or convex split face	**Expectations:** Retaining units are manufactured in pairs and it is not possible to control how the block' faces are going to look after blocks are split. At times a unit is going to have a concave split face and its pair a convex split face, which provides a slight 3-D effect on the wall. Concave and convex split faces are not considered a manufacturing issue as AS/NZS 4455.3 highlights that dimensional deviations shall not apply to the width of the unit if the intended character of the segmental retaining wall is to give an overall irregular surface. **Recommendations:** The best way to deal with it is place any pairs separately and to distribute them around the retaining wall. The most extreme units can always be placed as part of the embedment depth or in any area out of eye level. We would allow some units to be replaced when the concave face is too deep that develops a crack, or the convex face is extremely pronounced making the wall unpleasant.		
Colour variation	**Expectations:** Segmental Retaining Wall units are fabricated in a variety of single and blended colours, which normally require adding oxides into the concrete mix to create a nice range that satisfy customer's preferences and/or project requirements. Even when the colour is consistent within and between batches, each block will have its unique appearance and colour patterning. However, every now and then the sourced aggregates, the water/cement ratio or improper colour mixture might produce slight colour variations. **Recommendations:** If colour variation exceeds the range indicated by the Bowers Brothers' sample units, they should be put aside, and we will replace them. Those units shall not be placed as part of the exposed face of the retaining wall, but because they are structurally sound, they might be used as part of the embedment depth of the retaining wall where nobody will see them.		
Cracking	**Expectations:** A crack often refers of an imperfection or distress within the concrete masonry unit but does not typically compromise the structural integrity of the Segmental Retaining Wall. Hairline cracks are sometimes so small as to be barely perceptible and they are the result of internal stresses resulting from shrinkage, creep, and thermal expansion and contraction. As per ASTM C90-14, concrete blocks should not have visible cracks when viewed from 6.1 m in diffused light. In addition, cracks on exposed walls are acceptable when they are up to 0.5 mm wide and up to 25% of the height of the unit that are visible from closer distances. **Recommendations:** Identify cracked or damaged blocks prior to installation. If the cracks are over the tolerances, put the cracked units aside. However, hairline cracks do not cause problems with the stability of the retaining wall and are not a cause for rejection.		

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Dimensional tolerances	**Expectations:** Segmental retaining wall units are manufactured to tolerances that enable the units to be assembled into the wall to give a functional and aesthetically acceptable surface. AS/NZS 4455.3-2008 suggest that where the surfaces of the retaining wall units are intended to tightly interlock with other surfaces, the tolerances may be reduced to not more than ±3 mm between the mean and the work size to ensure that the intended action can be achieved. These dimensional deviations shall not apply to the width of the unit if the average width is not less than 90% of the work size due to the intended irregular split face character of the segmental retaining wall. **Recommendations:** Segmental retaining wall units should be examined and measured before being placed. If the units do not conform to the limits previously specified, they are liable to rejection and should be place aside.	 Minimal discrepancies	
Crumbling	**Expectations:** As the National Concrete Masonry Association (NCMA) suggests, the secret to create a good concrete block is a low water ratio, higher density, higher cement content and a properly graded mix to provide a dense, compacted. To achieve that, Bowers Brothers Concrete uses a state-of-the-art Columbia machine that measures moisture and accurately controls the water/cement ratio of the mix. However, at the end of a run it is possible that a portion of the mix does not get thoroughly blended or that extra water gets introduced into the block that deteriorates and dilutes the amount of cement in the mix. It is also possible that the blocks were not cured properly and the water within the units evaporated too quickly. **Recommendations:** This is a very unusual problem. If a crumbling block is identified, it should be placed aside and never on the retaining wall.	 Compacted blocks	
Chipping	**Expectations:** Chipping is an uncommon imperfection on the Retaining Walls units that is normally caused by blocks rubbing each other during transportation, by mishandling the units on-site, and occasionally, during the splitting process. As per Ministry of Business, Innovation and Employment recommendations on its guidelines to tolerances, materials and workmanship, chipping on concrete masonry units should be limited to up to 12.5 mm on any dimension on up to 5% of the units that are visible from closer distances. ASTM C90-14 suggests that chips and imperfections should not be evident when viewed from not less than 6.1 m of the constructed wall, under diffused light. **Recommendations:** Identify chipped or damaged units prior to installation. Be selective when laying the blocks, puttting damaged or chipped blocks to one side and do not lay them in highly visible areas. If the chipping is over the tolerances, do not use that unit.	 Free of chips