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Bill Thompson
CSR Research and Development Manager
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Dear Bill,

RE: Logicwall - Determination of Fire Resistance Level (FRL)

You have requested our comments regarding the determination of FRL by the method described in AS3600 and in this respect what useful information can be obtained from the CSIRO test report FSV 1038 on the fire resistance test of a 150 mm thick Logicwall specimen. All comments are within the framework of compliance with the BCA.

We proceed to comment on the applicability of the method of AS3600 for determining structural adequacy, integrity and insulation of a Logicwall fire-resisting wall. In particular, we are to consider whether or not a wall constructed using the Logicwall permanent formwork system falls within the scope of AS3600 and whether the method of determining structural adequacy, integrity and insulation of a wall in AS3600 is relevant. In this assessment we have relied upon the documented performance of the Logicwall specimen in the above-mentioned CSIRO test report to support our opinion with regard to the applicability of the methods given in AS3600 for the determination of structural adequacy to Logicwall walls.

Clause 1.1.1 of AS3600-2009 sets out the scope of the standard. Further guidance with regard to the determination of FRL is provided in Section 5 of the standard. After reviewing the scope and limitations of the standard we have formed the opinion that a concrete wall constructed using the Logicwall system falls within the scope of the standard.

• FIRE SAFETY ENGINEERS •

Structural Adequacy

With regard to the applicability of the methods given in AS3600 for the determination of structural adequacy, we have compared the observed behaviour of the Logicwall specimen when subjected to the fire-resistance test in the light of our understanding of the typical behaviour of reinforced concrete load-bearing walls when subjected to the fire resistance test. After examination of the CSIRO test report we have made the following observations:

1. Behaviour of the test specimen under test appears consistent with what we would expect for the behaviour of a conventional reinforced concrete load-bearing wall, considering the following observations:
 - The vertical crack pattern observed in the photos is consistent with what is expected of a conventional reinforced concrete load-bearing wall;
 - There was no evidence of cracking induced by the studs.
 - Failure was observed over joints in the face sheeting and not over studs;
 - Whilst the studs could result in an uneven temperature profile close to the exposed surface of the specimen, this profile however would be expected to rapidly even out as the heat conducted along the studs was absorbed by the concrete in contact with the stud.
2. Assuming the minimum cover requirement of AS3600 is being satisfied, the temperature variations in the plane of the reinforcement is not expected to be significantly affected by the studs. This is further supported by the temperatures measured on the cold face of the specimen not showing any higher temperatures over the studs.

Therefore in my opinion it is appropriate to undertake a determination of structural adequacy criterion of a wall in accordance with sub-clause 2(d)(ii) of Specification A2.3 of the BCA as if the wall was a conventional fire-rated wall in accordance with AS3600 disregarding the studs embedded in the wall.

Insulation

The method of determining the insulation criterion in AS3600 is based upon the overall concrete thickness of the wall. Ignoring the contribution of the face sheet, the effective thickness of the concrete can be determined from the width of the studs used in the wall. In case of the specimen which is the subject of CSIRO test report FSV 1038, the nominal 150 mm thick Logicwall specimen had an effective wall thickness of 136mm and satisfied the insulation criterion of AS1530.4 for 240 min (excluding inset power point). According to Table 5.7.2 of AS3600, an effective concrete thickness of 170 mm is required for such a rating. Therefore it can be concluded that it is likely that the face sheets contribute to overall insulation performance and the method for determining insulation criteria in AS3600 provides a conservative estimate in case of a wall constructed using Logicwall.

Examination of the temperatures measured on the unexposed face of the test specimen in CSIRO test FSV 1038 reveals no statistically significant differences in temperature over the studs as compared to those measured in-between the studs. The test data revealed generally lower temperatures (though not statistically significant) over the studs compared to in-between the studs. This phenomena was attributed to imperviousness of the steel to steam migration reducing the heat transfer near the studs. This could be regarded as a beneficial effect and thus no detrimental effect on the insulation performance resulted from the presence of the studs.

Therefore in my opinion it is appropriate to determine the insulation criterion of a Logicwall fire-resistant wall using the method described in AS3600.

Integrity

Reinforced concrete walls seldom fail in integrity. This fact is recognised in AS3600 as the basis for determining integrity failure is satisfactory performance in terms of structural adequacy and insulation. Therefore in my opinion it is appropriate to determine the integrity criterion of a Logicwall fire-resistant wall using the method described in AS3600.

If you have any questions in regard to these comments, please do not hesitate to contact us.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'C. Quaglia', with a stylized flourish at the end.

Carlos Quaglia
for **Stephen Grubits & Associates Pty Ltd**