

ICC-ES Report Overview of Tyfo FRP Systems and Compliance to the New Zealand Building Code through CodeMark™

New Zealand CodeMark™: CodeMark™ is a voluntary scheme which shows the compliance of products to specific clauses of the New Zealand Building Code. This is particularly useful if a product is innovative, relatively untried or would have serious consequences if they failed.

ICC Evaluation Service, LLC: ICC-ES is a product evaluation service in the USA which evaluates products to their compliance with the International Building Code (IBC) and the Uniform Building Code (UBC), a report pre-qualifies evaluated products to ensure they are fit for purpose and require annual audits to ensure continual compliance. The ICC-ES pre-report is totally independent and is one of the requirements on which the New Zealand CodeMark™ certification system has been based.

ICC-ES REPORTS						CODEMARK™
REPORT NUMBER	ICC-ES Report Holder	Evaluation Scope	Use	Product	Composites: combination of Fabrics and epoxy matrix	
ESR-2103 REISSUED 11/2015 SUBJECT TO RENEWAL 11/2016	Fyfe Co. LLC	Structural Fire propagation Toxicity Fire resistance Durability ¹	“...used as alternatives to systems described in the IBC and UBC to strengthen concrete and masonry structural elements. The systems also may be used for weather protection, interior finish, and fire resistance.” (ICC Evaluation Service, 2015, p. 1)	Fabrics: Tyfo SEH, Tyfo SCH, Tyfo WEB, Tyfo BC Epoxy Matrix: Tyfo S	Tyfo SEH 51A	
					Tyfo SCH 41S	
					Tyfo SCH 41	
					Tyfo SCH 41 2X	
					Tyfo WEB	
					Tyfo BC	






Information gathered in the comparison table above was derived from CodeMark™ certificates publically accessible through (The Ministry of Business, Innovation and Employment (MBIE), n.d.). MapeWrap products do not currently hold a CodeMark™ certificate and thus their compliance with the New Zealand Building Code cannot be determined from this source. Only the products listed in the ICC-ES Reports for Hexcel Corporation (ESR-3288) and Fyfe Co. LLC (ESR-2103) are compliant with the New Zealand Building Code under CodeMark™, other products by manufacturers may not be compliant with the New Zealand Building Code.

Potential Application Area Comparison between Major FRP Systems Derived from Respective ICC-ES Reports

PRODUCT	POTENTIAL APPLICATION AREA															
	Concrete Wall				Masonry Wall		Column					Beam			Slab	
	Out-of-plane flexural strength	In-plane flexural strength	Shear strength	Wall-Slab connection	Out-of-plane flexural strength	In-plane flexural strength	Ductility	Axial strength	Flexural strength	Shear Strength	Steel Reinforcement lap splice confinement	Ductility	Flexural strength	Shear strength	Flexural strength	In-plane shear strength
TYFO SCH 41S(1) COMPOSITE																
TYFO SCH-41 COMPOSITE																
TYFO SCH41 2X COMPOSITE																
TYFO WEB COMPOSITE																
TYFO BC COMPOSITE																
TYFO SEH-51 (A)																

¹ Defined by the (ICC Evaluation Service, 2010) in AC125

Other Attribute Comparison between Major FRP Systems Derived from Alternate Sources Based on Products Listed in Respective ICC-ES Reports

ATTRIBUTE	TYFO FIBRWRAP FIBER-REINFORCED COMPOSITE SYSTEMS
LOW V.O.C. LEVEL	 2 0%
UV STABILITY INDEPENDENT TESTING	 Testing provided on request
POTABLE WATER	 3
FIRE RESISTANCE	 4
ANCHOR TESTING	 Testing provided on request

² Information gathered from the manufacturer's data sheets as part of Certificate of Compliance

³ "Tyfo PWC epoxy is formulated for potable water contact and complies with ANSI/NSF 61" (ICC Evaluation Service Report 2103, 2015, p. 3, 4.2.3.3)

⁴ Tyfo Advanced Fire Protection System yields up to four-hour fire-resistance rating in accordance with ASTM E119. (ICC Evaluation Service Report 2103, 2015, p. 3, 4.2.3.4)

Purpose and Background

To provide a neutral way of comparing FRP products in New Zealand, we have used information from independent evaluations readily available in the ICC-ES reports. These reports clearly state what the products have been evaluated to do. To provide an overview and quick reference of the different brands being marketed in New Zealand we have collated relevant information into simple comparison tables. Designers that choose to use a particular product for applications that have not been tested and evaluated to perform, are doing so at their own risk and liability.

Disclaimer

Information contained within this guide is provided as is, every attempt to gather up-to-date and valid information has been made however it is recommended this guide is used in conjunction with the original reports and testing (as referenced) when specifying products for use in maintenance of concrete and/or masonry. The author and guide are affiliated with Fyfe Co. LLC and although resources have been collated and analysed in an impartial manner from independent sources, there may be inherent biases.

References

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The Ministry of Business, Innovation and Employment (MBIE). (n.d.). *Product Certificate Register - Ministry of Business, Innovation and Employment*. Retrieved March 17, 2016, from Building Performance: <http://www.building.govt.nz/product-certification-current-register>