

STUDY REPORT

SR 331 (2015)

Physical characteristics of new non-residential buildings 2014

MD Curtis



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Preface

This is the first annual report providing the results of the BRANZ Non-Residential Survey. BRANZ surveys builders and designers of non-residential buildings on the physical characteristics of the building. The purpose is to obtain data on non-residential buildings that is not available from official sources. This includes what type of materials are used. The data is useful for studies in the fields of sustainability, energy efficiency, durability and engineering.

Acknowledgments

This work was funded by the Building Research Levy. We would like to thank all of the builders and designers who filled in the survey form and returned it to BRANZ.

Note

This report is intended for building material manufacturers, retailers/wholesalers, builders, designers, researchers and Government officials.

Physical characteristics of new non-residential buildings

BRANZ Study Report SR 331

MD Curtis

Abstract

Official data on the characteristics of non-residential buildings is limited. Building consents data held by Statistics New Zealand gives numbers by building type, value and floor area, aggregated into territorial authorities. However, there is no data on materials used.

BRANZ began surveying builders and designers in 1998 to obtain data on materials used. We have since compiled a database of approximately 400 non-residential buildings per year containing information on the materials used by building component.

This report contains the results of these surveys on the materials used in new non-residential buildings. The aim is to provide information useful to building material manufacturers, retailers/wholesalers, builders, designers, researchers and Government officials.

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1. INTRODUCTION

BRANZ surveys about 1,600 non-residential buildings per year in the BRANZ Non-Residential Survey. It collects a variety of data on materials used in new and altered residential buildings.

The survey is a postal survey to the builder or designer identified on the building consent application form and the questions relate to each individual consent. Generally, 400 returns are received each year. An incentive is offered (a lotto ticket, book voucher, or reduced price on BRANZ publications) for the return of each survey form.

The consent information is obtained from the What's-On¹ building consent data. BRANZ uses this to determine a sample of non-residential buildings for each period from 31 territorial authorities.

The 31 territorial authorities surveyed are:

Auckland	Christchurch	Dunedin	Franklin
Far North	Gisborne	Hutt City	Hamilton
Invercargill	Kapiti	Manukau	Marlborough
Napier	New Plymouth	North Shore	Porirua
Palmerston North	Queenstown	Rodney	Southland
Tauranga	Thames-Coromandel	Tasman	Waikato
Waipa	Wellington	Western Bay of Plenty	Whangarei

Waitakere

The survey form is constantly evolving to include new questions as required. However, it is important for BRANZ to keep the survey form as simple, concise and clear as possible. Therefore, BRANZ keeps the survey form to a single page.

BRANZ weights the responses by the share of building activity for each building type in the calculation of the market share. This prevents some building types (such as farm buildings) from having a disproportionate share of the total market share should BRANZ receive a larger number of survey returns of one building type.

Using the data collected, representative estimates of the incidence and proportions of many different materials can be made. The components analysed are:

- Roof cladding
- Wall cladding
- Main structure
- Partition wall framing
- Wall infill framing
- Wall insulation
- Ceiling insulation
- Floor insulation

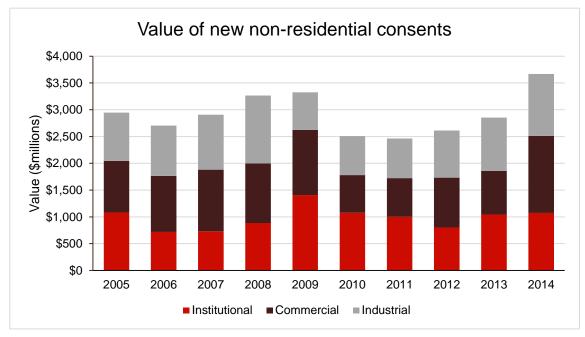
¹ Whats-On report (Monthly). TF Stevens & Co Ltd, Auckland, New Zealand.

A limitation of the survey is that it does not ask why certain materials are selected. This means that the report contains no commentary on why material trends might be changing.

The value of new non-residential consents is presented in Figure 1. The following figures encompass the growth period from 2006 through to 2009, as well as the decline in values between 2010 and 2013. 2014 saw a large increase in the value of consents for new non-residential buildings. This was largely due an increase in building activity driven by the commercial sector.

The values have been broken down into three different building types; institutional, commercial and industrial.

Figure 1. Value of new non-residential consents



2. SUMMARY

In general, many of the market shares of materials have been relatively steady over the years surveyed. There are a few exceptions to this:

- Sheet metal roof cladding had a significant decrease in share in 2014. This was largely due to the increase in the use of plastic in farm buildings.
- Steel main structural frames had a strong increase in share between 2012 and 2014.
- Timber wall infill framing decreased in share, largely at the expense of steel.

3. MAIN RESULTS

Key results are shown in the following charts. The data for these charts are in the tables in the appendix.

Due to the variations in the mix of buildings year-to-year, market shares can be highly variable. Therefore, changes in share may be due to a change of building types rather than a change in preference for any particular building material.

3.1 Roof Claddings

Sheet metal is the dominant roof cladding for new non-residential buildings. In the period from 2005 to 2011, sheet metal's share decreased from just over 90% to about 70%. The following two years saw an increase in its share up to 86%. However, in 2014 sheet metal's share decreased by 20 percentage points.

"Other" had a large increase in share in 2014. This is largely due to the increased use of plastic in farm buildings.

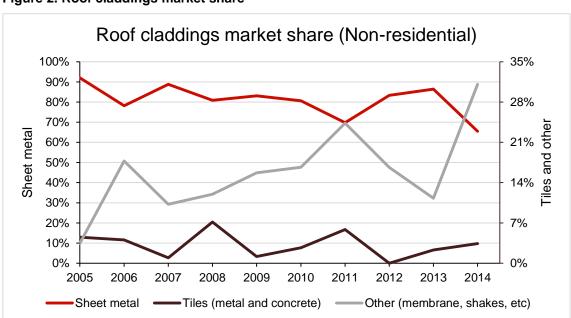


Figure 2. Roof claddings market share

3.2 Wall Claddings

Steel, aluminium and other metals are the dominant wall cladding material. Their share has been trending upwards since 2005, although 2014 saw a dip in share of about 16 percentage points. "Other" saw a slight uptick in share in 2014 after falling between 2011 and 2013.

Wall claddings market share (Non-residential) 70% 60% 50% 40% 30% 20% 10% 0% 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Steel, Aluminium and other Metals Concrete (bricks, blocks and panels) Timber (weatherboard and sheet) Other

Figure 3. Wall claddings market share

3.3 Main Structure

Steel main structural frames have been trending upwards over the period shown in Figure 4. This has largely been at the expense of concrete main structural frames which has trended downwards over the same period. Timber main structural frames have also been trending downwards.

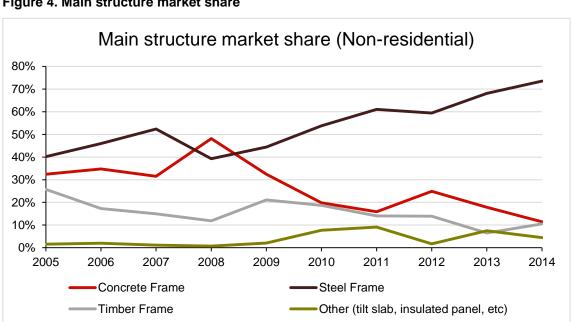


Figure 4. Main structure market share

3.4 Partition Wall Framing

Timber is the dominant partition wall framing material. Its share has trended downwards for several years. However, it had a strong increase in share in 2014 up to about 60%.

Steel increased its share between 2008 and 2012. However, 2013 saw a flattening out in its share before a fall in 2014.

Partition wall framing market share (Non-residential) 80% 70% 60% 50% 40% 30% 20% 10% 0% 2006 2007 2008 2009 2011 2012 2014 2005 2010 2013 Timber Other Steel

Figure 5. Partition wall framing market share

3.5 Wall Infill Framing

Wall infill framing is the framing between the main structural frame. Timber framing has been trending downwards over the period shown in Figure 6. In 2014, "Other" had a larger share than timber for the second time in 9 years.

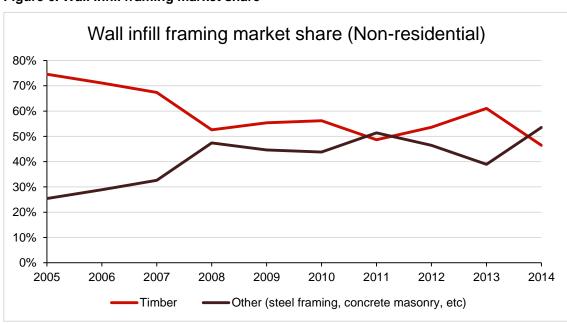


Figure 6. Wall infill framing market share

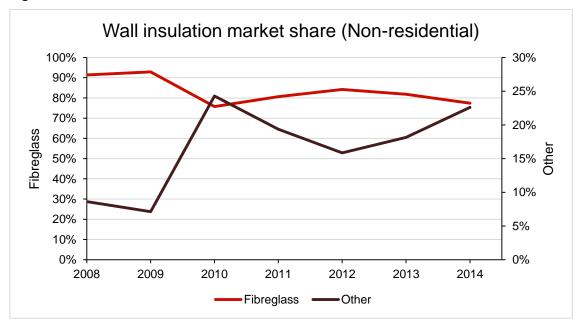
3.6 Insulation

Wall insulation, ceiling insulation and floor insulation are dealt with separately in this section. Farm buildings have not been included in the following market shares as it is uncommon for farm buildings to use insulation, and they have a large share of the non-residential building market.

3.6.1 Wall Insulation

Fibreglass is the dominant wall insulation material. Its share has been fairly steady since 2010.

Figure 7. Wall insulation market share



3.6.2 Ceiling Insulation

Fibreglass is also the dominant ceiling insulation material. Its share dipped between 2008 2011, but has been trending upwards recently (despite a small decrease in 2014).

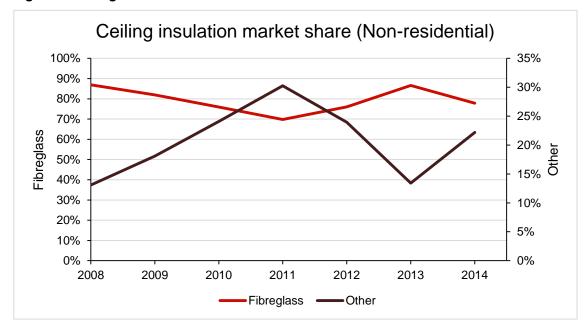


Figure 8. Ceiling insulation market share

3.6.3 Floor Insulation

The majority of non-residential buildings do not have floor insulation. For those buildings with floor insulation, sheet polystyrene is the most common floor insulation material. Both foil, and fibreglass or polyester have been common choices for floor insulation in the past.

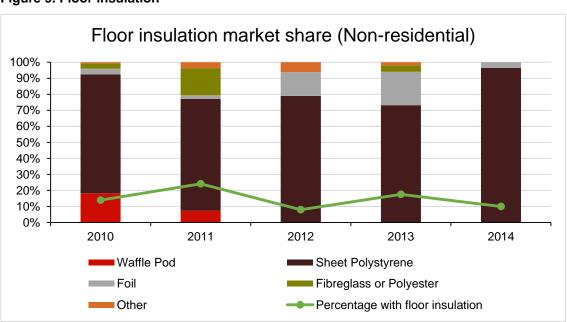


Figure 9. Floor insulation

4. APPENDIX

This appendix contains:

- Tables of data for the charts
- BRANZ Non-Residential survey forms.

4.1 Results Tables

Table 1. Roof claddings market share

Roof claddings market share in new non-residential buildings Yearly data 2005-2014										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Sheet metal	92%	78%	89%	81%	83%	81%	70%	83%	86%	66%
Tiles (metal and concrete)	5%	4%	1%	7%	1%	3%	6%	0%	2%	3%
Other (membrane, shakes, etc)	3%	18%	10%	12%	16%	17%	24%	17%	11%	31%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
lote: Percentages weighted to allow for different building types										

Table 2. Wall claddings market share

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steel, Aluminium and other Metals	29%	35%	37%	42%	49%	40%	49%	46%	59%	43%
Concrete (bricks, blocks and panels)	41%	35%	38%	41%	25%	35%	24%	28%	28%	26%
Timber (weatherboard and sheet)	7%	5%	5%	1%	6%	3%	5%	5%	2%	5%
Other	22%	26%	20%	17%	20%	22%	22%	20%	11%	26%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 3. Main structure market share

Main structure market share in new non-residential buildings Yearly data 2005-2014										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Concrete Frame	32%	35%	31%	48%	32%	20%	16%	25%	18%	11%
Steel Frame	40%	46%	52%	39%	44%	54%	61%	59%	68%	73%
Timber Frame	26%	17%	15%	12%	21%	19%	14%	14%	7%	11%
Other (tilt slab, insulated panel, etc)	2%	2%	1%	1%	2%	8%	9%	2%	8%	4%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Note: Percentages weighted to allow for different building types										

Table 4. Partition wall framing market share

Partition wall framing market share in new non-residential buildings Yearly data 2005-2014										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steel	17%	37%	36%	25%	29%	31%	33%	41%	40%	30%
Timber	68%	56%	59%	50%	58%	58%	48%	48%	47%	59%
Other	16%	7%	6%	25%	13%	11%	19%	11%	13%	10%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Note: Perc	Note: Percentages weighted to allow for different building types									

Table 5. Wall infill framing market share

Wall infill framing market share in new non-residential buildings Yearly data 2005-2014										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Timber	75%	71%	67%	53%	55%	56%	49%	54%	61%	46%
Other (steel framing, concrete masonry, etc)	25%	29%	33%	47%	45%	44%	51%	46%	39%	54%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Note: Percentages weighted to allow for different but	lote: Percentages weighted to allow for different building types									

Table 6. Wall insulation market share

Wall insulation market share in new non-residential buildings Yearly data 2008-2014										
	2008	2009	2010	2011	2012	2013	2014			
Fibreglass	91%	93%	76%	81%	84%	82%	77%			
Other	9%	7%	24%	19%	16%	18%	23%			
TOTAL	100%	100%	100%	100%	100%	100%	100%			
Note: Percent	tages weig	hted to allov	w for differe	nt building t	types					

Table 7. Ceiling insulation market share

Ceiling insulation market share in new non-residential buildings Yearly data 2005-2014										
	2008	2009	2010	2011	2012	2013	2014			
Fibreglass	87%	82%	76%	70%	76%	87%	78%			
Other	13%	18%	24%	30%	24%	13%	22%			
TOTAL	100%	100%	100%	100%	100%	100%	100%			
Note: Percent	ages weigl	nted to allow	v for differe	nt building t	ypes					

Table 8. Floor insulation market share

Floor insulation market share in new non-residential buildings Yearly data 2005-2014											
rearry data 2005-2014	2010	2011	2012	2013	2014						
Waffle Pod	18%	7%	0%	0%	0%						
Sheet Polystyrene	74%	70%	79%	73%	97%						
Foil	4%	2%	15%	21%	3%						
Fibreglass or Polyester	3%	17%	0%	4%	0%						
Other	1%	4%	6%	2%	0%						
TOTAL	100%	100%	100%	100%	100%						
Percentage with floor insulation	14%	24%	8%	18%	10%						
Note: Percentages weighted to allow	for different	building typ	oes								

4.2 Survey Form March 2007

Please give this form to the b Contract value of wor	-	to fill out for	the buildin	-	over the page	ı.	
					chool farm bu	ilding etc	
	tick Floor		(State ty)	oc, e.g. Omce, s	criooi, iaiiii bu	liding etc	
New		sqm		Number of st	oreys		
Addition		sqm		Average stor	ey height	m	
Alteration				(describe alte	erations)		
	ck one or more	tick		tick		tick	
Concrete frame	Timber fra		Conc blo	ock	Laminated	wood	
Steel frame	Tilt s	lab		Other		(state)	
Floor base material							
Concretesqn	n Particle Bo	ardso	•	Plywood	sqm	Other (state)	sqm
Partition Wall Framing Timber	S	eel	one or more Oth	e her	.(state)		
Amount of Timber Framing							
Cub metres	Wa <u>ll/floo</u>		Sizes/	spacing	1		
Walls Walls	or or	with with					
Floors	or	with					
Roof	or	with					
Roof	or	with					
cum Evernole We	sqm	am with 1	E0vE0mm	@600 otro			
Example Wa		qm with 1 sqn with 1					
Roof		•		truss @900 ctr	S.		
Secondary Wall Framing	tick one or	more					
	eel	Douglas fir	Co	oncrete block	Other	(state)	
Timber treatment (for frami	ng)	Р	Please tick of	one or more			
	Untreated I	<u>kiln dry U</u>	Intreated W	/et H1.2	T1.2 (orange) H3.1	
State where used (eg outer walls,							
Building wraps	•	one or more)		Davidatel	Dia di Danca	Oth (-t-t-)	
Roof Flamestop® The	ermakraft Bitum	ace (Greencap	Pauloid	Black Paper	Other (state)	
11001	(tick	one or more))				
Flamestop® Ty	yvek® Thermakra	t coverup Fra	ameGard II	Greenwrap	Fastwrap	Black Paper	Other (state)
Wall							
Wall cladding (only applica		w wall clade	ding)				
State type Type		0.0	+;	lt slab, 60%	also pluvos	d, solid plaster(n	nin 10mm\
Type		ū		block, 15%		laster on polysty	,
Type				glazing, 10%	•	el, PVC weather	
Type			-	ement, 15%		,	, , , , , , , , , , , , , , , , , , , ,
,. 			Total	100%			
If yes to Fibre Cement claddi	ng what is the Ma	nufacturer?		(tick one or more)	ı		
	BĞC CS		PRIMA	Other			
Fibre Cement Product was us	sed as (Circle	one or more)					
Applied text	ure finish sheet,	Flat sheet,	, F	C plank, FC	weatherboard	/Linea	
If solid plaster, what backing?	? (circle one if	solid plaster)					
fi	bre cement, plywo	od, p	aper,	Triple S,	block/brick,	metal lathe	
Wet area linings (bathroom,	kitchen, laundry	etc)					
• '	k one or more and	•	mate squar	e meters used.			
	eratone Villab		ardiglaze	GIB	Aqualine	Other	(state)
m2	m2	m2	m2	m2	m2	m2	
Roof cladding (only applica			_	oof area	sa metre	es.	
					4	-	
eg pre-coated steel shallov metal tiles, butyl rub		•		oneet,			
Thank You. Please fold this				е		Mar-07	

4.3 Survey Form November 2011

NON-RESIDENTIAL	
Please give this form to the builder or designer to fill out for the building consent listed over the page. Contract value of work (incl sub-trades) \$	
Type of Building (state type) e.g. Office, school, farm building etc	
tick floor area	
New sqm Number of storeys:	
Addition sqm Average storey height: m Alteration (describe alteration)	
Alteration (describe alteration) Are you claiming "green" building features? Yes / No If Yes, what type?	_
Main Structure	_
Concrete Frame Timber Frame Concrete block LVL Glulam	
Steel Frame Tilt Slab Other (state)	
Floor Base Material	_
Concrete sqm Particle Board sqm Plywood sqm Other (state) sqm	
If concrete, have any steel deck trays been used? Yes / No (circle one)	
Partition Wall Framing (tick one or more)	
Timber Steel Concrete Other (state)	
Wall Infill Framing (between main frame) (tick one or more)	
Radiata Steel Douglas Fir Concrete block Other (state)	
Prefabrication	
Are any prefabricated components used? Yes / No If yes, describe applicable component(s) below:	
Prefab Floors	
Prefab Walls Prefab Other	
Insulation Pink Bradford Premier Brown FG Greenstuf Other Other	
(tick one or more) None Batts Gold Fibreglass Rocwool (polyester) Polyester Wool Polystyrene (state)	
Wall insulation	
Ceiling insulation	
Expol Polystyrene (not Polythene) Snug Sisalation Ribraft Other	•
None Warmfeet Under Slab Floor Foil Floor Cupolex (state)	
Floor insulation	
Builder Other (please specify)	
Insulation Installer (name)	
Building Wraps (tick one or more) Black Other	
Flamestop Thermacraft Bitumac CoverTek Pauloid Paper (state) Diflex 130 Tekton Roof wrap	
Black Other	
(tick one or more) Flamestop Tyvek Thermacraft Frameguard Home RAB Fastwrap Paper (state) Diflex 130 Tekton Ecopiy Barri	er
Wall wrap	
Wall Cladding State type and approximate % wall coverage	
e.g. Fibre cement, 75% Other examples include: tilt slab, concrete block, steel zincalum, glazing, alumunium, Clay Brick, 15% radiata WB, linea WB etc.	
Cedar WB, 10%	
Type	
Type % area	
Type% area	
Hardies BGC CSR PRIMA Other Eterpan If Fibre Cement cladding is used, who is the manufacturer?	
Fibre Cement product used as Applied texture finish sheet, Flat sheet, FC plank (7.5mm), Linea (16mm) If solid plaster, what backing was used? Fibre cement, plywood, paper, Triple S, block/brick, metal lathe	
Wet Area Linings (bathroom, kitchen, laundry etc) Please state the approximate square metres used	
Formica Aquapanel Seratone Villaboard Hardiglaze GIB Aqualine Other (state)	
m² m² m² m² m² m²	
Roof Cladding (only applicaple if there is new roof cladding)	
What roof cladding was used? (circle one or state below)	
metal tiles, prepainted corrugated, trough zincalum, other steel profiles, concrete tiles, butyl, asphalt shingles,	
other (state) Approx. Roof Area: sqm	
Type of roof structure Timber Steel Concrete Slab	
Thank you. Please fold this form, and freepost it in the return envelope Nov-11	

4.4 Survey Form December 2014

NON-RESIDENTIAL
Please give this form to the builder or designer to fill out for the building consent listed over the page. Contract value of work (Incl sub-trades) \$ incl GST
Type of Building (state type) e.g. Office, school, farm building etc
tick floor area
New sqm Number of storeys:
Addition sqm Average storey height: m Alteration (describe alterations)
Alteration (describe alterations) Are you claiming "green" building features? Yes / No If Yes, what type?
Main Structure
Concrete Frame Timber Frame Concrete Block LVL Glulam
Steel Frame Tilt Slab Insulated Panel Other (state)
Floor Base Material
Concrete sqm Particle Board sqm Plywood sqm Other (state) sqm
If concrete, have any steel deck trays been used? Yes / No (circle one)
Partition Wall Framing (tick one or more)
Timber Steel Concrete Other (state)
Wall Infill Framing (between main frame) (tick one or more)
Radiata Steel Douglas Fir Concrete block Other (state)
Prefabrication
Are any prefabricated components used? Yes / No If yes, describe applicable component(s) below:
Prefab Frame Prefab Floors
Prefab Walls Prefab Other
Insulation Pink Bradford Knauf Autex Other Other
(tick one or more) None Batts Gold Premier Earthwool Greenstuf Polyester Wool Polystyrene (state)
Wall insulation
Ceiling insulation
Expol Polystyrene (not Polythene Pink Batts Sisalation Waffle Pod Other
None Warmfeet Under Slab Snug Floor Foil Floor Cupolex (state)
Pioor insulation
Builder Other (please specify)
Insulation Installer (name)
Building Wraps Flamestop Thermakraft Bitumac CoverTek Pauloid Tyvek Supro Other (state) Watergate plus Tekton
Roof Wrap
(tick one or more) Flamestop Tyvek Thermakraft Coverup Home RAB Fastwrap Other Watergate Tektor Ecoply Barrier Bitumac Pauloid
Wall Wrap
Wall Cladding State type and approximate % wall coverage
e.g. Concrete block, 75% Other examples include: tilt slab, concrete block, steel zincalum, glazing, alumunium, radiata WB, linea WB etc.
Ceder WB, 10%
Type % area
Type % area
Type % area
If Fibre Cement product, what is it used as? (circle one) Applied texture finish sheet, Flat sheet, FC plank (7.5mm), Linea (16mm)
Wet Area Linings (bathroom, kitchen, laundry etc)
Please state the approximate square metres used
Formica Aquapanel Seratone Villaboard Hardiglaze GIB Aqualine Other (state)
m² m² m² m² m² m² m²
Roof Cladding (only applicable if there is new roof cladding)
What roof cladding was used? (circle one or state below)
metal tiles, prepainted corrugated, trough zincalum, other steel profiles, concrete tiles, butyl, asphalt shingles, other (state) Approx. Roof Area: sgm
Type of roof structure Timber Steel Concrete Slab Thank you. Please fold this form, and freepost it in the return envelope Dec-14
Uet-19