MORTARLESS MASONRY
FOR INTERTENANCY WALLS
FIRTH RAPIDSTAK™ MORTARLESS MASONRY HAS BEEN SPECIFICALLY DEVELOPED FOR COMMERCIAL & INDUSTRIAL APPLICATIONS TO ENABLE FASTER, SIMPLER AND MORE COST-EFFECTIVE CONSTRUCTION. RAPIDSTAK™ DELIVERS THESE ADVANTAGES WITHOUT COMPROMISING ANY OF THE BENEFITS OF CONVENTIONAL MASONRY CONSTRUCTION: LOW MAINTENANCE, STRENGTH, DURABILITY, NOISE REDUCTION & FIRE RESISTANCE.
COST EFFECTIVE
Firth RapidStak™ means quick and easy construction. You will achieve shorter project completion times than you would using conventional mortared masonry. Get the RapidStak™ advantage of faster construction and fewer delays.

SPEED AND EFFICIENCY
RapidStak™ is fast. Only the first course of RapidStak™ is mortared. The rest of the wall can be dry stacked, reinforced, propped and grouted with RapidStak Fill™, all in one day. There is no need to clean out excess mortar and there is less waste to remove from site.

RapidStak™ achieves more with the same resources. Use RapidStak™ for faster, more effective masonry construction and a competitive advantage due to speed of installation.

SIMPLICITY ITSELF
The RapidStak™ masonry range comprises four standard blocks for construction of virtually any wall.

RapidStak™ projects are easy to plan, easy to price and easy to construct.

ACCURATE
RapidStak™ Mortarless Masonry is manufactured to height tolerances so walls can be dry stacked quickly and accurately. Apart from laying the first course of RapidStak™ with mortar, to establish a level starting point, the rest of the wall is constructed without mortar.

Keeping each course of RapidStak™ level and laid to a line is essential. Firth provides simple wedges to adjust the level where required.

NO WEATHER DELAYS
There should be no stoppages due to weather. You can keep on laying RapidStak™ even when it rains. Less dependence on the weather means more reliable outcomes for you and your clients.

MASONRY CONSTRUCTION
RapidStak™ combines the advantages of mortarless construction with all the benefits expected of conventional masonry: noise reduction, fire resistance, low maintenance, strength and durability.

Go to this link to watch a video of RapidStak™ installation

www.firth.co.nz/rapidstak
FIRTH RAPIDSTAK™
MORTARLESS
MASONRY FOR
INTER TENANCY
WALLS

COMPRised OF

4
MASONRY UNITS

RAPIDSTAK™
WALL DIAGRAM

NOTE: RAPIDSTAK™ WALLS SHOULD ALWAYS BE SOLID FILLED WITH RAPIDSTAK BLOCKFILL™

RS20.14 is used as the bond beam block for the top course only. The rest of the wall is installed with the RS20.16.
Specific design is required for buildings constructed with RapidStak™ Mortarless Masonry. The performance and specific design methods for RapidStak™ are the same as for conventional mortared masonry construction. Reference should be made to NZS4230 Design for Masonry Structures.

Construction with RapidStak™ complies with existing masonry Standards without alteration. RapidStak™ can be used wherever conventional Firth 20-Series masonry would be used. RapidStak™ Mortarless Masonry is always solid filled with RapidStak Fill™. Construction shall comply with NZS4210 Masonry Construction: Materials and Workmanship.

**NOISE REDUCTION**

Walls built with RapidStak™ provide excellent sound insulation, with a sound attenuation of STC56* (i.e. a reduction in sound by 56dB) for an unlined wall meeting the Standard required for inter-tenancy walls. *Based on testing of RapidStak masonry blocks at the University of Auckland. The STC rating can be increased as required. See table 1.

**STRENGTH**

RapidStak™ is manufactured to a compressive strength in accordance with NZS4210.

**STRUCTURAL PERFORMANCE**

Holmes Solutions Limited, a subsidiary of Holmes Group Limited, confirms that tests show the overall structural performance of a RapidStak™ Mortarless Masonry wall is similar to that expected for conventional masonry walls.
HOW FIRTH RAPIDSTAK™ STACKS UP

THE FIRTH RAPIDSTAK™ SYSTEM CAN REDUCE INSTALLATION TIME UP TO 50% COMPARED TO TRADITIONAL MASONRY BLOCKWORK CONSTRUCTION
BUILDINGS CONSTRUCTED WITH RAPIDSTAK™ MORTARLESS MASONRY, LIKE ALL BUILDINGS CONSTRUCTED WITH MASONRY, MUST MEET THE REQUIREMENTS OF SEVERAL CLAUSES WITHIN THE NEW ZEALAND BUILDING CODE

B1 STRUCTURE
All buildings constructed with RapidStak™ should be designed in accordance with NZS4230 (parts 1 & 2), Design for Masonry Structures.

Timber and other methods of construction used in conjunction with RapidStak™ should comply with the relevant Acceptable Solutions or Verification Methods.

B2 DURABILITY
Because concrete masonry forms the structure of the building it must be durable for a minimum of 50 years.

Clause 2.1.1 of NZS4210, Masonry Construction: Materials and Workmanship, states that a concrete masonry building will fulfill the requirements of B1 if it complies with Appendix 2.E (of NZS4210). Refer to the table in this appendix for the durability requirements applicable for different New Zealand locations.

H1 ENERGY EFFICIENCY
Construction in accordance with NZS4218, H1 Energy Efficiency – Housing and Small Building Envelopes, satisfies NZBC H1.3.1 (a) for all buildings with a floor area of less than 300m² per unit.
CONSTRUCTION & INSTALLATION DETAILS

Foundations for RapidStak™ are to be prepared as for a conventional masonry wall. Before commencing construction ensure the position of the wall is correct and in accordance with the plans. Note: Set out of vertical reinforcing varies from conventional masonry.

1 STARTER BAR LAYOUT

Correct placement of starter bars is critical since reinforcing set-out differs from that for conventional masonry construction. The first starter bar is placed 100mm in from the ends and corners. The second starter bar is 300mm from the first bar. Other starter bars are spaced at 400mm or 200mm as required by the engineering design.

2 MORTAR THE FIRST COURSE

The first course of RapidStak™ must be laid with mortar to overcome any variances in the foundations and to ensure that the base of the wall provides a level starting point. Dricon® Trade Mortar is recommended. It is worth investing the extra time to ensure the base is level because any inaccuracies will be reflected and multiplied as the height of the wall increases.

3 DRY STACK THE WALL

Now erect the wall by simply dry stacking RapidStak™ in a running bond pattern.

4 ADJUST WITH WEDGES WHERE NECESSARY TO MAINTAIN LEVELS

RapidStak™ is manufactured to height tolerances to minimise the need to make adjustments. However, it is essential that levels are maintained to a line and RapidStak™ wedges are to be used where required to achieve this. Every 3 courses check that the wall is plumb and straight. If an individual RapidStak™ is out of plumb it can be lightly tapped into place.
CUTTING RAPIDSTACK™

It may be necessary to cut an individual RapidStak™ to length so that a specific wall dimension is achieved. The cut block should not be placed at the end of the wall.

GLUING TO AVOID BLOWOUTS WHEN GROUTING

During grouting, there is the possibility of blowouts caused by hydrostatic pressure at the end of the walls, corners and at T-junctions. To eliminate this potential for blowouts, the last metre of blocks at the end of each course, at corners and at T-junctions, must be glued horizontally using a construction adhesive suitable for use on masonry. Wherever used, cover the full width of the shell face edge of the blocks with the construction adhesive. Best practice end propping of the wall is also required (8). The construction adhesive should be gap filling, moisture cure polyurethane glue which develops rapid early strength and is specially formulated to be unaffected by wet construction site conditions. Use Sika Boom G or similar.

VERTICAL STEEL PLACEMENT

Vertical steel reinforcement is to be placed as per the specific design after the blocks have been stacked. As for mortared masonry, vertical steel is to be tied to the vertical starter bars with access via “cutouts”. Care must be taken to ensure cutouts are cut in the first course of laid blocks at the required intervals adjacent to the starter bars.

HORIZONTAL STEEL PLACEMENT

Horizontal steel as specified in the design is to be placed in the same manner as for standard Firth 20-Series masonry blocks.

PROPPING

The need for temporary propping or bracing of masonry walls during construction is often overlooked. An unfilled wall is very susceptible to failure from strong winds. Typically walls over 1m in height are at significant risk. It is important to take some measures to brace the wall in order to prevent its premature failure. Typically bracing at 3m centres is recommended in line on both sides of the wall. Refer NZS4210.
Vertical shrinkage control joints to minimise cracking should be introduced at the lesser of 5 metre centres or twice the height of the wall. Designers should refer to NZS4230, Design for Masonry Structures and NZS4210, Masonry Construction: Materials and Workmanship.

Control joints are also recommended wherever:
- Main walls intersect other walls
- There are control joints in the floors

**CONTROL JOINTS**

RapidStak™ Mortarless Masonry requires specific design. The design engineer will determine if control joints are required. The circumstances in which control joints are needed are the same as for solid filled conventional masonry.

Vertical reinforcing
- Concrete masonry
- Sealant
- Backing rod

Horizontal reinforcing
- Sealant
- Backing rod

**NB:** Shall be continuous horizontal for top bond beam as per NZS 4230

**PRE-GROUTING CHECKLIST**

PRIOR TO COMMENCING GROUTING, ENSURE:
- The wall is plumb and straight. If an individual RapidStak™ is out of plane it can be lightly tapped into place, this should be done within 3 courses of the laying height.
- The face, ends and corners of the wall have been propped.
- All vertical reinforcement steel is in place and tied to the starter bars.
- Where services are to run through the wall, that all conduits are correctly installed and will not interfere with the flow of the grout around vertical and horizontal steel.
- The structural engineer has inspected and approved the wall.

**GROUTING**

RapidStak™ walls should be always solid filled with RapidStak Fill™. Dampen the block cavities prior to pouring the wall to assist the flow and compaction. RapidStak Fill™ should be compacted by rodding until settlement stops. Placement can be done using a grout pump, but care should be taken to avoid displacement of masonry units or creep in the wall.

Any of the grouting methods specified in NZS4210 may be followed. **Expansive admixture must not be used.**

**REMOVE PLASTIC WEDGES**

Once the grout has cured any protruding plastic wedges can be removed or clipped off with a trowel.

**GROUTING, HIGH LIFT WITHOUT EXPANSIVE**

Fill masonry walls to NZS 4210: clause 2.12, The high lift without expansive admixture method, up to a maximum height of 3600mm in maximum lifts of 1200mm. Consolidate by rodding. Wait between each lift until grout settles, but before any set takes place (between 15 and 60 minutes) before pouring the next lift. Consolidate by mechanical vibrator with 300mm penetration into the previous lift. Wait after the final lift as before and reconsolidate the top 300mm by mechanical vibrator.

Do not mechanically vibrate RapidStak™ Mortarless Masonry. Do not use expansive additives.
Determine the sheet position for either vertical or horizontal fixing and mark on wall.

GIB® plasterboard sheets can be fixed vertically or horizontally. Horizontal fixing creates fewer joints and is recommended.

Use GIB-Cove® Bond to bond the GIB® plasterboard to concrete or masonry surfaces.

Mix GIB-Cove® Bond to a smooth, thick consistency.

Apply GIB-Cove® Bond daubs approximately 50mm diameter x 12mm thick at 300–400mm centres vertically and 500–600mm centres horizontally. Ensure that adhesive is placed no closer than 25mm from the edge of the sheet.

Where irregularities up to 10mm occur on the masonry surface, use larger daubs of adhesive to bridge the gap.

Position the sheet and press into place.

Obtain true alignment and flatness by using a long straightedge over the surface of the sheet.

Alternatively, apply adhesive over the entire back surface of the sheet using a notched trowel.

Apply GIB-Cove® or GIB® Trims to wall and ceiling intersections.

Fix skirting and architrave with masonry nails or adhesive.

Direct bonding of GIB® plasterboard to concrete or brick masonry walls must only be considered when the concrete or masonry substrate is thoroughly dry and adequately protected against moisture penetration. The substrate must be firm, dry, and free of dust, grease, release agents and curing compounds. In situations where dampness or rain penetration problems exist, corrective measures must be taken prior to installation of interior linings. Movement and control joints in the main structure must be carried through the GIB® plasterboard linings. This can be achieved by installing a control joint in the plasterboard.

DIRECT BONDING (FOR SHEET HEIGHTS UP TO 3M)

- Determine the sheet position for either vertical or horizontal fixing and mark on wall.
- GIB® plasterboard sheets can be fixed vertically or horizontally. Horizontal fixing creates fewer joints and is recommended.
- Use GIB-Cove® Bond to bond the GIB® plasterboard to concrete or masonry surfaces.
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- Apply GIB-Cove® or GIB® Trims to wall and ceiling intersections.
- Fix skirting and architrave with masonry nails or adhesive.

WALL STRAPPING MUST BE USED:

- When the concrete or masonry wall is below ground level.
- When the concrete or masonry wall is an external wall, unless a proprietary external weatherproofing system can be verified as providing weather tightness for the life of the building.
- In bathrooms, laundries and other wet areas.
- When the concrete or masonry substrate or paintwork is in poor condition.
- When the wall surface contains irregularities of more than 8-10mm strapping can be packed to provide a flat surface for the plasterboard.
- For walls in excess of 3.0m in height.
- Use either nominally 50 x 25mm timber strapping or metal furring channels. Deeper strapping may be required to accommodate insulation requirements.
- Fix DPC behind timber strapping.
- Fix strapping vertically to the wall surface at a maximum of 600mm centres, with either a continuous horizontal batten or nogs at the top and bottom of the wall.
- Install services prior to installing GIB® plasterboard linings.

GROUTING, LOW LIFT

Fill masonry walls to NZS 4210: clause 2.14. The low lift grouting method, up to a maximum height of 1200mm. Consolidate by rodding and then prepare a construction joint to NZS 4210: clause 2.16. Horizontal construction joints, before repeating the sequence.

LIMIT RATE

Limit rate of pour to avoid hydrostatic blowouts.

HOW TO DIRECT FIX, STRAP & LINE

Reference gib site guide for residential & commercial installations www.gib.co.nz

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Notes:

- Refer to NZS 4229 or specific design for masonry wall reinforcement details.
- Refer to specific design for dimensions and reinforcing of RibRaft® floor system.

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13
INTER TENANCY WALL
INTERMEDIATE FLOOR DETAIL

14
INTER TENANCY WALL
ROOF DETAIL

15
INTER TENANCY WALL
TEE JUNCTION - TYPE 1

16
INTER TENANCY WALL
TEE JUNCTION - TYPE 2
SOUND TRANSMISSION RATING LINING OPTIONS

RAPIDSTAK™ STC LINING RATINGS

<table>
<thead>
<tr>
<th>LINING</th>
<th>ACOUSTIC PERFORMANCE (STC)</th>
<th>WIDTH OF WALL (APPROX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO LINING (RAPIDSTAK™ 190 SOLID FILLED)</td>
<td>56</td>
<td>190mm</td>
</tr>
<tr>
<td>DIRECT FIXED 10mm GIB STANDARD PLASTERBOARD (ONE SIDE)</td>
<td>56</td>
<td>200mm</td>
</tr>
<tr>
<td>DIRECT FIXED 10mm GIB STANDARD PLASTERBOARD (BOTH SIDE)</td>
<td>56</td>
<td>210mm</td>
</tr>
<tr>
<td>10mm GIB STANDARD PLASTERBOARD ON 45mm TIMBER STUD AT MINIMUM 600 CENTRES WITH 50mm FIBREGLASS OR POLYESTER INSULATION (ONE SIDE)</td>
<td>60</td>
<td>245mm</td>
</tr>
<tr>
<td>10mm GIB STANDARD PLASTERBOARD ON 45mm TIMBER STUD AT MINIMUM 600 CENTRES WITH 50mm FIBREGLASS OR POLYESTER INSULATION (TWO SIDE)</td>
<td>63*</td>
<td>300mm</td>
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<tr>
<td>13mm GIB FYRELINE PLASTERBOARD ON 45mm TIMBER STUD AT MINIMUM 600 CENTRES WITH 50mm FIBREGLASS OR POLYESTER INSULATION (ONE SIDE)</td>
<td>60</td>
<td>248mm</td>
</tr>
<tr>
<td>13mm GIB FYRELINE PLASTERBOARD ON 45mm TIMBER STUD AT MINIMUM 600 CENTRES WITH 50mm FIBREGLASS OR POLYESTER INSULATION (BOTH SIDE)</td>
<td>67*</td>
<td>306mm</td>
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</tbody>
</table>

*Note: values greater than STC 60 may not be achieved in the field unless comprehensive measures are taken to suppress flanking transmission. Results obtained using modeling.

RAPIDSTAK™ STC FOR BARE WALL

Sound reduction index, R, in accordance with ISO 10140-2
Laboratory measurements of airborne sound insulation of building elements

Description and identification of the test specimen and test arrangement:

Date of test: 17-Dec-15
Airborne sound insulation of a filled masonry block wall
Client: Firth
Test Wall: Firth RapidStak™ mortarless masonry blocks (200mm x 200mm x 398mm). Blocks laid filled with concrete.

Source chamber: Chamber C, Receiving chamber: Chamber A. Test specimen installed by client. Curing time:

Area S of test specimen: 11.93 m$^2$
Mass per unit area: 0.00 kg/m$^2$
Air temp in the test rooms: 24 °C
Air humidity in test rooms: 60 %
Source room volume: 209 m$^3$
Receiving room volume: 202 m$^3$

<table>
<thead>
<tr>
<th>Frequency, f, Hz</th>
<th>One-third octave, C$_{50-5000}$, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>38.9</td>
</tr>
<tr>
<td>63</td>
<td>42.3</td>
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<tr>
<td>80</td>
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<tr>
<td>4000</td>
<td>69.3</td>
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<tr>
<td>5000</td>
<td>70.4</td>
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</tbody>
</table>

Notes: 1. N/A = Value not available.
2. Bold values are used to calculate STC and $R_w$.
3. Words in Blue Italic in the description are manufacturers brand names.

Rating according to ISO 717-1: $R_w (C_{50-5000}) = 56$ (-2.6 dB) Sound Transmission Class = 56 dB
Rating according to ASTM E413-87
$C_{50-5000} = -2$ dB $C_{50-3150} = -8$ dB

Computer files:
Emitted noise: ID.0
Received noise: ID.1
Reverberation time: ID.2

Name of test institute: University of Auckland Acoustics Testing Service
Signature: Preliminary
Date: 17-Dec-15
WHO CAN BUILD WITH RAPIDSTAK™?
Only LBP registered block layers who are familiar with using Firth RapidStak™ Mortarless Masonry.

HOW DOES RAPIDSTAK™ ENABLE FASTER MASONRY CONSTRUCTION?
Typically the blocklayer lays the first course with mortar the day before then the wall is stacked and poured the following day.

WHY IS MORTAR NEEDED TO LAY THE FIRST COURSE OF RAPIDSTAK™?
Mortar is essential to overcome any variances in the foundations or floor and to provide a level base for the rest of the wall.

HOW DOES RAPIDSTAK™ MORTARLESS MASONRY PERFORM COMPARED WITH MORTARED MASONRY?
Walls constructed with RapidStak™ perform the same as those built with conventional mortared masonry in terms of: structural performance, durability, noise reduction & fire resistance.

HOW IS THE WALL KEPT STRAIGHT AND PLUMB WITHOUT MORTAR?
Firth provides RapidStak™ wedges to be used where necessary as each course is laid. However, during manufacture each RapidStak™ is manufactured to a height tolerance so there is minimal need for wedging to keep the wall plumb.

ARE RAPIDSTAK™ MORTARLESS MASONRY WALLS PARTIAL OR SOLID FILLED?
RapidStak™ masonry walls are always solid filled with RapidStak Blockfill™.

HOW MANY DIFFERENT TYPES OF BLOCKS ARE THERE IN THE RAPIDSTAK™ RANGE OF MASONRY?
There are four different blocks in the RapidStak™ range. See page 4 for details.

HOW HIGH CAN A RAPIDSTAK™ WALL BE DRY STACKED BEFORE IT NEEDS TO BE GROUTED?
As with mortared masonry, it is recommended that RapidStak™ masonry walls are built no higher than 3 metres prior to grouting with RapidStak Fill™. Walls shall always be propped - in accordance with NZS4210.

WHAT PREVENTS WALL END BLOWOUTS DUE TO HYDROSTATIC PRESSURE DURING GROUTING?
The potential for end blowouts during grouting will be eliminated by using Sika Boom G Foam to horizontally glue the last metre of each course of RapidStak™ at the end of walls, at corners and at T-Junctions. Best practice end propping is also required.

ARE CONTROL JOINTS REQUIRED?
Yes. Although subject to specific design, control joints generally are required where main walls intersect other walls and where there are control joints in the floor - in accordance with NZS4210.

BUILDING WITH MORTARED MASONRY IS TRIED AND TRUE, SO HOW RELIABLE IS THE NEW RAPIDSTACK™ TECHNOLOGY?
Firth has developed the manufacturing technology used to make RapidStak™ specifically for New Zealand conditions. While mortarless construction may be new to New Zealand it has been widely accepted in Europe and North America for many years.
Environmentally compliant manufacturing plants
Surplus water and some aggregates recycled
Low transport impacts
Leftover concrete returned from construction sites
Passive solar heated thermal mass makes completed buildings more energy-efficient
Most wash water returned from construction sites
Highly durable, low maintenance buildings and no rot
High degree of noise control
Inherent fire resistance
Overall longer effective building life
Demolished concrete can be recycled as hard fill or aggregate

PLEASE NOTE
This Manual has been prepared by Fletcher Concrete and Infrastructure Limited trading as Firth Industries ("Firth"), solely to provide general information on construction with RapidStak™ and not as specific advice to any particular recipient or person or in respect of any particular situation. Notwithstanding the contents of this Manual, construction with RapidStak™ should be undertaken in accordance with the New Zealand Building Code, all relevant statutory and regulatory requirements and all relevant New Zealand Standards. Any person contemplating construction with RapidStak™ should carry out their own investigations and inquiries as to their specific requirements.

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• any damages, losses, costs or expenses including, without limitation, direct, indirect, special or consequential damages (including but not limited to damages arising from negligence) arising from or in connection with any access to, use of or reliance on the contents of this Manual.

Further, successful construction with RapidStak™ is dependent on numerous factors outside Firth’s control - for example, quality of workmanship, particular design requirements and non-Firth products. Firth will not be liable in relation to any of these factors.

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