

Bricklayer-mason

Occupational Analysis Report

December 2009



Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the trade of bricklayer-mason as currently practiced in Québec's construction industry. It is a record of discussions held by a group of workers who met for the occasion after industry partners recommended them to the Commission de la construction du Québec for their expertise in the trade.

The vocational analysis is a first step in the definition of the skills required for practicing the trade. This report becomes one of the reference and decision-making tools used by the Commission for teaching and learning purposes.

The Commission is not responsible for the contents of this report. The latter has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

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The masculine gender is used generically
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ACKNOWLEDGEMENTS

Production of the present report was made possible by the collaboration and participation of many people. The Commission de la construction du Québec (CCQ) is grateful for the quality of the information provided by those consulted, and gives special thanks to the bricklayer-masons who so generously agreed to participate in the analysis workshop regarding their trade. The persons consulted are:

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The CCQ extends special thanks to the Commission de la santé et de la sécurité du travail and to ASP Construction its representative, Mr. Jacques Plante, for their collaboration in producing the occupational health and safety grids appended to the present report.

APPROVAL

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INTRODUCTION

In early 2009, the CCQ's Direction de la formation professionnelle launched a large-scale operation to review the occupational analyses¹ of all construction trades.

The CCQ undertook this operation mainly for the following reasons:

- the project to reform the construction workforce apprenticeship and management system, and the eventual design of qualitative apprenticeship booklets requiring a detailed description of each trade;
- the fact that most construction occupational analyses² had been conducted between 1987 and 1991 and had not been reviewed since;
- updates to vocational qualifying examination question banks;
- implementation of Chapter 7 of the Agreement on Internal Trade (AIT) and of the Québec-France Understanding on the Mutual Recognition of Professional Qualifications.

These factors demonstrate the necessity of performing occupational analyses in order to obtain a current and complete provincial profile of the various trades.

The occupational analysis for bricklayer-mason belongs to this context.³ Its purpose is to describe the trade as currently practiced in the construction industry. The present report was written in order to collate and organize the information gathered during the occupational analysis workshop held in Laval on October 13 and 14, 2009.

This analysis aims to draw a portrait (tasks and operations) of the trade and its conditions, and to identify the skills and behaviours required. The report of the occupational analysis workshop is an accurate reflection of the consensus reached by a group of workers in the bricklayer-mason trade. A special effort was made to include all the data collected during the workshop and to ensure that the data accurately depict the realities of the trade analysed.

1 The terms "profession" and "trade" are used indistinctly.

2 Occupational analyses were then called "work situation analyses".

3 This occupational analysis was conducted according to the *Cadre de référence et instrumentation pour l'analyse d'une profession* produced in 2007 by the ministère de l'Éducation, du Loisir et du Sport (Direction générale de la formation professionnelle et technique) and the Commission des partenaires du marché du travail, ministère de l'Emploi et de la Solidarité sociale.

1. GENERAL CHARACTERISTICS OF THE TRADE

1.1 DEFINITION OF THE TRADE

According to the Regulation respecting the vocational training of manpower in the construction industry, Annex A, article 18, the term “bricklayer-mason” means:

[...] anyone who:

- a) cuts, saws, joint-points and lays, by using mortar, cement or any other adhesive material, the following masonry items:
 - i. brick, natural or artificial stone;
 - ii. acid brick, fire brick, brick made of plastic, cement or any other refractory material, all such bricks being laid by hand, machine or compressor;
 - iii. refractory material tiles;
 - iv. terra-cotta;
 - v. architectural precast concrete;
 - vi. blocks made of gypsum, concrete or glass, composition materials and light aggregates, for walls or partitions;
- b) sets and welds anchoring devices; applies rigid insulation inside walls and masonry cavities.

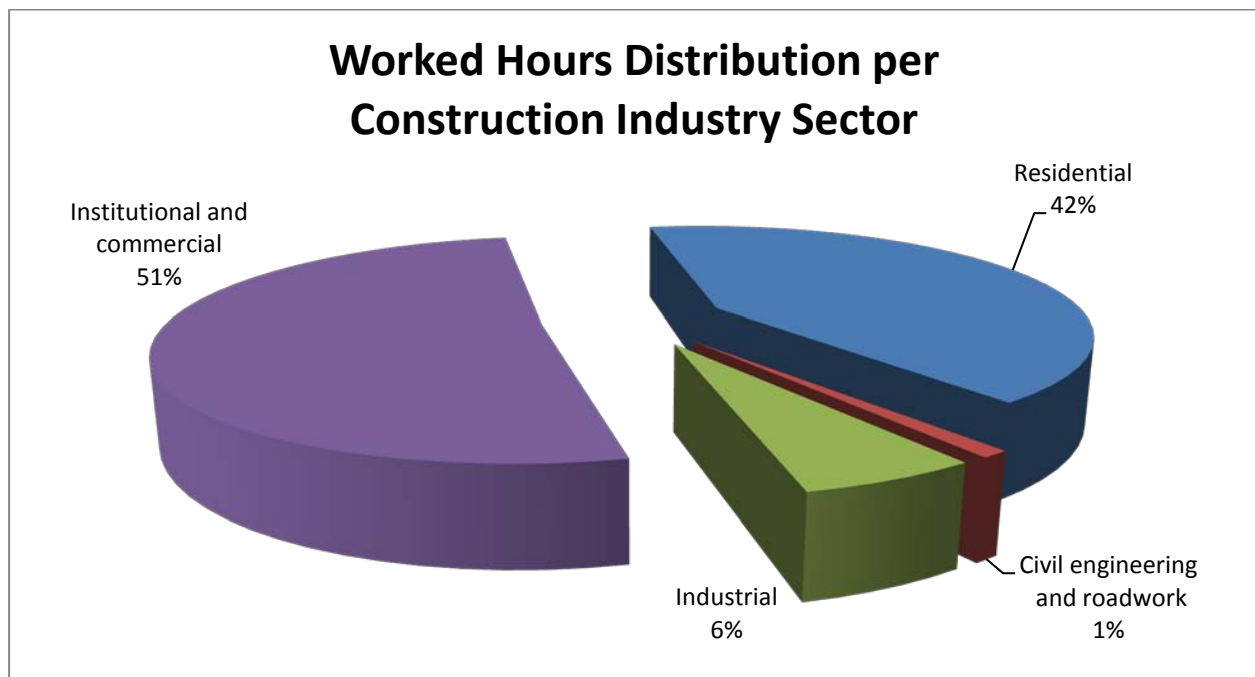
1.2 JOB TITLES

The title “bricklayer-mason” is the only one used for describing the trade; it is therefore the title used in the present report.

However, although the title “bricklayer-mason” is not confusing, a few participants commented that some of their tasks are confused at times with those of tile setters. Nevertheless, this is not a common situation.

1.3 SECTORS OF ACTIVITY

Bricklayer-masons are active in the four sectors of the construction industry, but to varying degrees. The diagram below illustrates the work time allocation of all Québec bricklayer-masons for the year 2008⁴. It shows that the institutional and commercial sector shares with the residential sector almost all the working hours of bricklayer-masons.



However, we asked the participants how their work time is allocated in relation to the four construction industry sectors. The results are somewhat different from the provincial averages presented above. The bricklayer-masons we consulted spend on average 39% of their time in the institutional and commercial sector, 36% in the industrial sector, and 25% in the residential sector. None of the participants work in the civil engineering and roadwork sector. The table below compares the results of bricklayer-masons in attendance with those of Québec as a whole.

4. Commission de la construction du Québec, *Carrières construction*, 2008-2009 edition.

Table 1.1 Comparison of the Time Spent in Each Sector

Sector	Percentage of Work Time per Sector (%)	
	All Bricklayer-masons in Québec	Participants in the Meeting
Institutional and commercial	50	39
Industrial	6	36
Civil engineering and roadwork	1	0
Residential	42	25

Moreover, we asked participants how many of them work with refractory materials, and for what percentage of their time. 6 of the 12 participants work with refractory materials, reportedly 3 to 100% of the time, for an average of 38%⁵.

1.4 FIELD OF PRACTICE

The trade's field of practice is the construction industry. The Act respecting labour relations, vocational training, and manpower management in the construction industry (R.S.Q., c. R-20) defines construction as follows:

[...] the foundation, erection, maintenance, renewal, repair, alteration and demolition work on buildings and civil engineering works carried out on the job site itself and vicinity including the previous preparatory work on the ground;

In addition, the word "construction" includes the installation, repair and maintenance of machinery and equipment, work carried out in part on the job site itself and in part in the shop, moving of buildings, transportation of employees, dredging, turfing, cutting and pruning of trees and shrubs and laying out of golf courses, but solely in the cases determined by regulation.

5. The average time all meeting participants spend with refractory products is 19%.

1.5 LEGISLATION AND REGULATIONS

Construction industry bricklayer-masons are subject to:

- ❖ the Act respecting Labour relations, vocational training and workforce management in the construction industry (R.S.Q., c. R-20);
- ❖ the Regulation respecting the vocational training of workforce in the construction industry (R-20, r.6.2)
- ❖ the four sector-based collective agreements for the construction industry;
- ❖ the Safety Code for the construction industry (R.Q. c. S-2.1, r.6);
- ❖ the National Building Code of Canada-Canada 2005 (NBC);
- ❖ the Québec Building Code, Chapter I, “Building”;
- ❖ the various municipal by-laws in effect (urban planning regulations, master plans, zoning regulations, etc.);
- ❖ Canadian Standards Association (CSA) standards – particularly the following:
 - series A 165-04: CSA Standards on Concrete Masonry Units (68 pages);
 - series A 82-06: Fired Masonry Brick Made from Clay or Shale (52 pages);
 - series A 179-04: Mortar and Grout for Unit Masonry (72 pages);
 - series A 371-04: Masonry Construction for Buildings (86 pages);
 - series A 405-M87: Design and Construction of Masonry Chimneys and Fireplaces (34 pages), confirmed in 2003 with no changes.

1.6 WORKING CONDITIONS

The following information provides an overview of the conditions and context of the work of bricklayer-masons, as commented on by the bricklayer-masons attending the occupational analysis workshop. To obtain up-to-date and complete information, it is necessary to refer to the four collective agreements for the construction industry sectors.

Salary⁶

A journeyman's hourly wage varies somewhat by sector. In May 2009, it was as follows:

- Industrial, institutional and commercial: \$31.87
- Civil engineering and roadwork: \$32.20
- Residential (light): \$29.32
- Residential (heavy): \$31.02

Vacations and time off⁷

Mandatory annual holidays of four weeks – two weeks in summer and two in winter at periods predetermined in collective agreements – are the general rule in the construction industry. To avoid penalizing employers and employees experiencing special constraints, the industry's four collective agreements allow certain possibilities for changing the vacation periods prescribed by the general rule.

To these vacation periods are added eight not paid statutory holidays, as well as a lump sum for sick leaves not otherwise paid.

Pension plan

Construction industry workers participate in a pension plan. They retain their eligibility for this pension plan throughout their career in construction, even if they change employer, trade or sector.

Insurance

The group insurance plan (medications, illness, disability, death) is fully paid by employers. Workers (and their families, as the case may be) are eligible for it so long as they remain active in the construction industry and work the required number of hours, whether or not they change employer.

6. Salary data are taken from 2007-2010 collective agreements in the construction industry and from the following document, published by the Commission de la construction du Québec: *Carrières construction*, 2008-2009 edition.

7. Data on vacations and time off, the pension plan and insurance are taken from the following document, published in 2009 by the Commission de la construction du Québec: *La construction au Québec: c'est bien plus payant!*

Physical requirements

According to participants, the work generally requires being in good physical condition. The bricklayer-mason almost always works standing up and often in a crouched or bent-over position, which requires endurance and flexibility. Since he is always in motion and must regularly make repetitive movements, his muscles and joints are used extensively. The pace of work is sustained, and the bricklayer-mason must be able to maintain it. He must often lift loads that are quite heavy, which requires good physical strength. However, it was mentioned that efficient working methods can often compensate for this requirement.

Work schedules

A 40-hour work week from Monday to Friday is the general in all construction industry sectors. The daily limit is 8 hours per day, except in light residential construction, where it can reach a maximum of 10 hours within a 40-hour work week.

To avoid penalizing employers and employees experiencing special constraints, the industry's four collective agreements allow many possibilities for changing the vacation periods prescribed by the general rule: compressed schedule, schedule shift, make-up time in light residential construction, etc. These special schedules confer flexibility to the work schedules in effect in the construction industry.

Bricklayer-masons work mainly in daytime; however, they may occasionally have to work in the evening and weekend, depending on work in progress. Most bricklayer-masons work on average 8 months per year (some up to 10 months), particularly between March and December.

We note that the work schedules of bricklayer-masons who apply refractory materials, especially in the industrial sector, are somewhat different. Those bricklayer-masons are likely to work year-round, and their schedule must adapt to company requirements. Since their tasks often consist of repairing installations, a production stop is usually required. They must therefore respond as rapidly as possible, often by working for many hours in a short period.

1.7 JOB MARKET ENTRY CONDITIONS ⁸

To obtain the apprentice competency certificate in any construction industry trade, candidates must first:

- Supply proof that they are at least 16 years of age;
- Supply their social insurance number and their home address;
- Present their certificate for having passed the course *Santé et sécurité générale sur le chantier de construction*;
- Pay the required fees;
- Designate the union association to which they wish to belong.

In addition, candidates who have obtained a diploma recognized by the CCQ (DEP in bricklaying-masonry) must:

- Present the original version of an academic transcript or apprenticeship transcript attesting that they have passed the DEP;
- Present a guarantee of employment from an employer registered with the CCQ for at least 150 hours within a period of not more than three consecutive months.

Candidates who meet these conditions then obtain a competency certificate-apprentice (CCA) in the bricklayer-mason trade.

Although the construction industry favours graduates for access to the trade, labour shortages may at times make it necessary for the CCQ to admit candidates without a diploma.

8. See http://www.ccq.org/E_CertificatsCompetence.aspx?sc_lang=en&profil=GrandPublic.

Thus, candidates without a diploma⁹ are eligible to obtain a competency certificate-apprentice (CCA) in a trade only during a labour shortage and must:

- Supply proof that they have the academic prerequisites for the program leading to a vocational studies diploma (DEP) in the trade referred to in the application or pledge, by signing a consent letter, to take the necessary training to obtain those academic prerequisites;
- Present a guarantee of employment registered during a labour-pool opening by an employer registered with the Commission de la construction du Québec (CCQ), for at least 150 hours over a period of at most three consecutive months.

The apprentice bricklayer-mason must have completed 3 apprenticeship periods of 2,000 hours each (6,000 hours total) in order to be eligible for the provincial qualification examination that leads to obtaining the competency certificate-journeyman for the trade. Hour credits are paid into the apprenticeship record book of an apprentice bricklayer-mason who has obtained his DEP.

Moreover, certain qualities are sought by employers hiring new bricklayer-masons. The following list presents the main qualities¹⁰, according to participants:

- Speed of execution
- interest in the trade
- punctuality
- autonomy and sense of initiative
- reliability
- work cleanliness
- Productivity.

9. Of the 12 participants in the workshop, 6 began practicing the trade without training.

10. The qualities are presented in the order in which they were mentioned and not necessarily in order of importance.

1.8 PLACE OF WOMEN IN THE TRADE

Section 126.0.1 of the Act respecting labour relations, vocational training, and manpower management in the construction industry pertains to women's access to the construction industry: "The Commission, after consultation with the Commission des droits de la personne et des droits de la jeunesse, shall develop measures to favour the access of women to and their maintenance and greater representation on the labour market in the construction industry."

According to the CCQ¹¹, the proportion of women in the bricklayer-mason trade is 0.5 % (26 women out of 4,898 bricklayer-masons in 2008). According to participants, the main reason for the fact that very few women practice the trade is the necessity of carrying heavy loads (materials), which requires substantial physical strength.

However, participants mentioned that women interested in the trade can choose types of work that require less physical strength, for example in the residential sector.

In terms of constraints, it was also mentioned that work in a mainly masculine environment, with resulting comments by co-workers, can discourage some women from practicing the trade.

1.9 CAREER PROSPECTS

With experience and depending on his fields of interest, a bricklayer-mason may be conferred greater responsibilities within the company and become, for example, a team leader, foreman or, eventually, contractor.

1.10 DEVELOPMENT OF THE TRADE

According to participants, there will be more and more repair work in coming years. In their view, given the high cost of new construction, clients will be more inclined to preserve and retrofit existing buildings (works). In addition, a number of historic or heritage buildings will need substantial work.

11. Commission de la construction du Québec, *Carrières construction*, Québec, 2009-2010 edition.

With regard to new construction, participants already observe a trend (with the exception of high-end construction) to limit the scale of surfaces covered with masonry, in order to save construction costs. They expect this trend to continue in coming years.

1.11 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

Generally, participants say they have become more concerned with protecting the environment and applying related standards. In terms of major changes, participants mention certain products that were used for a long time and are no longer because of the application of environmental standards. For example, hydrochloric acid, long used to clean brick or stone work, among other things, has been replaced by other products less damaging to the environment. Participants mention that these products are significantly less effective, so that their use requires the bricklayer-mason to work longer.

Protection from dust produced, for example, by cutting bricks, stones, composite materials, etc., requires measures such as the use of tile or vacuum saws. Installing such equipment takes a little more time, so bricklayer-masons have to take this into account in their time management.

Bricklayer-masons must also pay special attention to debris thrown in containers, because certain materials should not be mixed together, and others should not be there at all. This requires bricklayer-masons to be vigilant.

Participants mention that environmental protection concerns are very present in the residential sector, since many clients (or their neighbours) attach a lot of importance to this aspect.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

List of tasks

The following list presents the main tasks performed by bricklayer-masons. The order in which the tasks are presented does not necessarily reflect their importance in the trade.

- Task 1 Lay bricks and blocks
- Task 2 Lay sawn ashlar, glass blocks and manually handled pre-cut members
- Task 3 Lay free stone
- Task 4 Lay architectural precast concrete members
- Task 5 Repair masonry
- Task 6 Mount a fireplace
- Task 7 Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles
- Task 8 Spray refractory substances
- Task 9 Install refractory members inside electrolytic cells

Table of tasks and operations

A table of tasks and operations performed by bricklayer-masons was proposed to workshop participants. Following discussions, changes were made. The final version is presented in the following pages. It should be noted that the table's initial version included the task "Mount a smokestack," which was withdrawn, this type of work being ever-rarer since companies tend to purchase prefabricated smokestacks. This task's operations, which consist of laying bricks, refractory or not, are nevertheless in task 1, "Laying bricks and blocks," and in task 7, "Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles."

Table 2.1 Tasks and Operations

TASKS	OPERATIONS						
1. Lay bricks and blocks	1.1 Examine the work to be done	1.2 Check materials, tools and equipment	1.3 Groundwork	1.4 Erect scaffolds, if applicable	1.5 Handle materials and install equipment	1.6 Clean and prepare surfaces to be covered	1.7 Lay flashing, if applicable
	1.8 Put the paper and insulation in place, if applicable	1.9 Take measurements, if applicable	1.10 Mix the mortar	1.11 Install the lines	1.12 Spread the mortar	1.13 Lay corner bricks or blocks	1.14 Lay the first row of bricks or blocks
	1.15 Install anchors	1.16 Lay flashing, if applicable	1.17 Install reinforcements, if applicable	1.18 Lay bricks or blocks and put accessories in place	1.19 Finish the joints	1.20 Install expansion and caulking joints	1.21 Install retaining anchors
	1.22 Wash bricks or blocks	1.23 Disassemble scaffolds, if applicable	1.24 Restore the premises				
2. Lay sawn ashlar, glass blocks and manually handled pre-cut members	2.1 Examine the work to be done	2.2 Check materials, tools and equipment	2.3 Groundwork	2.4 Erect scaffolds, if applicable	2.5 Handle materials and install equipment	2.6 Clean and prepare surfaces to be covered	2.7 Check or install flashing
	2.8 Apply the paper or insulation	2.9 Take measurements	2.10 Mix the mortar	2.11 Spread the mortar	2.12 Lay corner stones, blocks or members	2.13 Install the lines	2.14 Complete the first row
	2.15 Install anchors and accessories, if applicable	2.16 Mount the structure, clean and equalize the joints	2.17 Install expansion joints	2.18 Finish the joints	2.19 Wash stones, blocks or members	2.20 Disassemble scaffolds, if applicable	2.21 Restore the premises

TASKS	OPERATIONS						
3. Lay free stone	3.1 Examine the work to be done	3.2 Check materials, tools and equipment	3.3 Groundwork	3.4 Erect scaffolds, if applicable	3.5 Handle materials and install equipment	3.6 Clean and prepare surfaces to be covered	3.7 Check or install flashing
	3.8 Apply the paper or insulation	3.9 Take measurements	3.10 Scabble	3.11 Mix the mortar	3.12 Spread the mortar	3.13 Lay corner stones	3.14 Install the lines
	3.15 Lay stones, anchors and accessories, and attach or shim	3.16 Wash the stone	3.17 Finish the joints	3.18 Disassemble scaffolds, if applicable	3.19 Restore the premises		
4. Lay architectural precast concrete members	4.1 Examine the work to be done	4.2 Check materials, tools and equipment	4.3 Guide the operator to position the members	4.4 Install the lines, if applicable	4.5 Do alignment and levelling work	4.6 Install permanent anchors (weld, bolt)	4.7 Remove temporary anchors
	4.8 Joint precast members	4.9 Wash the members	4.10 Restore the premises				
5. Repair masonry	5.1 Examine the work to be done	5.2 Check materials, tools and equipment	5.3 Groundwork	5.4 Erect scaffolds, if applicable	5.5 Handle materials and install equipment	5.6 Remove defective materials and empty the joints	5.7 Clean and dampen surfaces
	5.8 Install the lines, if applicable	5.9 Install repair members	5.10 Disassemble scaffolds, if applicable	5.11 Restore the premises			

TASKS	OPERATIONS						
6. Mount a fireplace	6.1 Examine the work to be done	6.2 Check materials, tools and equipment	6.3 Groundwork	6.4 Erect scaffolds, if applicable	6.5 Take measurements	6.6 Handle materials and install equipment	6.7 Prepare the base
	6.8 Pour a concrete slab, if applicable	6.9 Mark the fireplace's location	6.10 Mix the mortar	6.11 Lay back-up or refractory bricks or install the caisson, if applicable	6.12 Install accessories	6.13 Make the smoke chamber	6.14 Erect the chimney
	6.15 Disassemble scaffolds, if applicable	6.16 Restore the premises					
7. Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles	7.1 Examine the work to be done	7.2 Check materials, tools and equipment	7.3 Erect scaffolds, if applicable	7.4 Handle materials and install equipment	7.5 Install anchors	7.6 Lay out wool, plastic, refractory bricks or acid-proof bricks and tiles	7.7 Disassemble scaffolds, if applicable
	7.8 Restore the premises						
8. Spray refractory substances	8.1 Examine the work to be done	8.2 Check materials, tools and equipment	8.3 Erect scaffolds, if applicable	8.4 Install the machines	8.5 Handle the materials	8.6 Install feed pipes	8.7 Check the operation of machines
	8.8 Install anchors	8.9 Ensure that the machine is supplied	8.10 Apply the substances	8.11 Equalize the surfaces	8.12 Clean the machines	8.13 Disassemble scaffolds, if applicable	8.14 Restore the premises

TASKS	OPERATIONS						
9. Install refractory members inside electrolytic cells	9.1 Examine the work to be done	9.2 Handle the materials	9.3 Install alumina bed rulers	9.4 Lay the alumina bed	9.5 Remove alumina bed rulers	9.6 Install inter-cathode plates	9.7 Install cathode bars
	9.8 Finish bricklaying between cathodes	9.9 Cement the cathodes	9.10 Lay the side slabs	9.11 Restore the premises	9.12 Reline		

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

In the following pages are presented sub-operations related to certain operations¹², as well as a few clarifications made by participants.

Table 2.2 Sub-Operations and Clarifications

TASK 1 LAY BRICKS AND BLOCKS		
<p>Products and results</p> <p>Construction of bearing, decorative, party, faced, prefabricated, retaining, foundation¹³, fire, soundproof and radiant walls, stairs, railings, arches, vaults, paving, chimneys, ceilings, cold chambers, fences, etc.</p> <p>The main models (or drawings) produced by bricklayer-masons are: soldiers, diamond points, French corners, arches, 45° corners, round walls, etc.</p> <p>Note: When bricklayer-masons can be assisted by labourers, operations 1.3, 1.4, 1.5, 1.10, 1.23 and 1.24 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.</p>		
Operations	Sub-Operations	Clarifications
<p>1.1 Examine the work to be done</p>	<p>1.1.1 Receive verbal instructions from the foreman 1.1.2 Examine the plan, if applicable 1.1.3 Ensure the safety of the premises 1.1.4 Coordinate your work with that of other trades, if applicable</p>	<p>Although this is not the general rule, occasionally the bricklayer-mason has to examine a plan or specifications to learn about the work. However, the plans and specifications are usually interpreted by the foreman, who then verbally tells the bricklayer-mason their main points. Likewise, coordinating the work with the other trades is normally the foreman's responsibility, but may at times be the bricklayer-mason's.</p>
<p>1.2 Check materials, tools and equipment</p>		<p>This is an inspection of the quantity and quality of materials, as well as their conformity with the foreman's instructions. There is also verification that the tools required for the work are on hand.</p>

12. The sequence of operations may vary.

13. Block foundation walls are still tolerated in some municipalities.

TASK 1 LAY BRICKS AND BLOCKS		
Operations	Sub-Operations	Clarifications
1.2 Check materials, tools and equipment (<i>CONT'D</i>)		The quality of materials is also inspected as the bricklayer-mason takes each brick (or block) to lay it. Damaged or non-compliant bricks or blocks are then put aside.
1.3 Groundwork	1.3.1 Clear the ground of any debris 1.3.2 Level the ground 1.3.3 Ensure the ground is solid 1.3.4 Protect surrounding surfaces	The ground may be outdoors or the floor of a building or home. The preparation may consist of delimiting the work area with lanyards to prevent passersby from entering (according to municipal requirements), of spreading tarpaulins or planks to protect surfaces adjacent to those to be covered, etc.
1.4 Erect scaffolds, if applicable		The bricklayer-mason may have to erect all kinds of scaffolds that can be installed manually.
1.5 Handle materials and install equipment		Handling may be done with a lift truck, depending on quantity and weight. If the bricklayer-mason himself uses a lift truck, he must have taken prior training in its safe operation.
1.6 Clean and prepare surfaces to be covered		Cleaning may consist of passing the broom, removing nails or insulation debris, etc.
1.7 Lay flashing, if applicable		

TASK 1 LAY BRICKS AND BLOCKS		
Operations	Sub-Operations	Clarifications
1.8 Put the paper and insulation in place, if applicable ¹⁴	1.8.1 Unroll the paper on the surface 1.8.2 Fasten the paper with staples or nails 1.8.3 Seal the connections 1.8.4 Apply insulation sheets 1.8.5 Seal the space between sheets	This is vapour barrier paper.
1.9 Take measurements, if applicable	1.9.1 Check the height of openings (doors, windows, etc.) 1.9.2 Check the gauge of bricks or blocks 1.9.3 Determine joint thickness by distributing available space 1.9.4 Evaluate the angle of arches, if applicable	The first row of bricks is laid dry (without mortar) beforehand to ensure exact measurements.
1.10 Mix the mortar	1.10.1 Obtain clean water 1.10.2 Add colorant, if applicable 1.10.3 Obtain sand with appropriate granulation, if applicable 1.10.4 Dose the ingredients, if applicable 1.10.5 Mix mortar and water in the mixer 1.10.6 Proceed to mix 1.10.7 Observe the mixing time 1.10.8 Observe the setting time 1.10.8 Finish mixing	The mortar may be premixed. Setting time may vary depending on the work done and the materials used. The choice of mortar depends on the weather, the materials used, available space (to store the sand, for example), etc.

14. The experts in the trade who participated in the workshop responded to the best of their knowledge and understanding of their trade and field of application. However, the CCQ's collective agreement application branch has issued a notice that, according to the *Regulation respecting the vocational training and qualification of manpower in the construction industry*, applying the paper is the carpenter-joiner's responsibility.

TASK 1 LAY BRICKS AND BLOCKS		
Operations	Sub-Operations	Clarifications
1.11 Install the lines	1.11.1 Hang the corner line 1.11.2 Link the corner line on each row by the centre line	
1.12 Spread the mortar	1.12.1 Check that the base is clean and free of any particles 1.12.2 Spread on the rows of bricks or blocks 1.12.3 Make beads and grooves 1.12.4 Remove mortar fallen in the back 1.12.5 Recover excess mortar	The mortar is spread using a trowel.
1.13 Lay corner bricks or blocks	1.13.1 Make markers 1.13.2 Lay corner bricks 1.13.3 Place the line on the row	It is always important to have a row in advance on the corner.
1.14 Lay the first row of bricks or blocks	1.14.1 Leave empty joints for the weepholes	
1.15 Install anchors		The quantity and position of anchors are determined by building codes.
1.16 Lay flashing, if applicable		Flashing is installed above angle irons, on openings and between rows.
1.17 Install reinforcements, if applicable		
1.18 Lay bricks or blocks and put accessories in place		

TASK 1 LAY BRICKS AND BLOCKS		
Operations	Sub-Operations	Clarifications
1.19 Finish the joints	1.19.1 Smooth the joints 1.19.2 Brush the masonry work	The joints have to be smoothed with a jointer. The work is then brushed to eliminate excess mortar.
1.20 Install expansion and caulking joints	1.20.1 Place a backer rod in the cavity 1.20.2 Cover with silicone	
1.21 Install retaining anchors	1.21.1 Fasten angle irons on the structure (welding or mechanical anchoring)	Earthquake-resistant standards, among others, apply to determine the quantity and position of anchors.
1.22 Wash bricks or blocks		Washing serves to eliminate mortar residues on bricks and blocks.
1.23 Disassemble scaffolds, if applicable		
1.24 Restore the premises		

TASK 2 LAY SAWN ASHLAR, GLASS BLOCKS AND MANUALLY HANDLED PRE-CUT MEMBERS

Products and results

Sawn ashlar: construction of bearing, decorative, party, faced, prefabricated, retaining, soundproof and radiant walls, stairs, railings, arches, vaults, wine cellars, chimneys, ceilings (rarely), etc.

Glass blocks: construction of decorative walls, floors, wall light screens, showers, flower boxes, fences, etc.

Precast members: construction of bearing, decorative, party, faced, prefabricated, retaining, soundproof and radiant walls, wall light screens, flower boxes, fences, stairs, railings, arches, vaults, chimneys, ceilings.

The participants agree to define “sawn ashlar” as stone, generally natural, that has been sawn at the plant and is so delivered to the place of work. The bricklayer-mason therefore does not have to cut it before installing it.

Precast members may be made of various materials, generally concrete, as are members in Task 4. What distinguishes the two types of members is their size: those in Task 2 are manually moved and laid out by the bricklayer-mason, whereas those in Task 4 require the use of hoisting equipment. The means of handling has a major impact on the bricklayer-mason’s work.

Note: When bricklayer-masons can be assisted by labourers, operations 2.3, 2.4, 2.5, 2.6, 2.10, 2.19, 2.20 and 2.21 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.

Operations	Sub-Operations	Clarifications
2.1 Examine the work to be done	See operation 1.1	
2.2 Check materials, tools and equipment		
2.3 Groundwork	See operation 1.3	
2.4 Erect scaffolds, if applicable		
2.5 Handle materials and install equipment		
2.6 Clean and prepare surfaces to be covered		

TASK 2 LAY SAWN ASHLAR, GLASS BLOCKS AND MANUALLY HANDLED PRE-CUT MEMBERS		
Operations	Sub-Operations	Clarifications
2.7 Check or install flashing	2.7.1 Depending on the type, glue or staple the flashing	Occasionally flashing is already in place so that the bricklayer-mason does not have to lay it. He must then check it to ensure that it is in good condition and well installed.
2.8 Apply the paper or insulation ¹⁵	2.8.1 Place the paper 2.8.2 Staple or nail the insulation 2.8.3 Seal the joints	
2.9 Take measurements	2.9.1 Check the height of each opening 2.9.2 Gauge the height of each corner	
2.10 Mix the mortar	See operation 1.10	
2.11 Spread the mortar	See operation 1.12	
2.12 Lay corner stones, blocks or members		
2.13 Install the lines		
2.14 Complete the first row		
2.15 Install anchors and accessories, if applicable		
2.16 Mount the structure, clean and equalize the joints	2.16.1 Remove excess mortar	
2.17 Install expansion joints	2.17.1 Place a backer rod in the cavity 2.17.2 Cover with silicone	

15. Referred to note No 14, p. 20.

TASK 2 LAY SAWN ASHLAR, GLASS BLOCKS AND MANUALLY HANDLED PRE-CUT MEMBERS		
Operations	Sub-Operations	Clarifications
2.18 Finish the joints	2.18.1 Finish the joints at mid-height of the work	The joints should not be finished only at the end of assembly when all bricks and blocks have been laid. This procedure results in a neat finish before the mortar is too dry.
2.19 Wash stones, blocks or members		
2.20 Disassemble scaffolds, if applicable		
2.21 Restore the premises		
TASK 3 LAY FREE STONE		
<p>Products and results</p> <p>Construction of bearing, decorative, party, faced, prefabricated, retaining, foundation, soundproof and radiant walls, stairs, railings, arches, vaults, wine cellars, paving, chimneys, ceilings.</p> <p>The participants agree to define free stone as natural stone that must be cut by the bricklayer-mason before being laid. This designation includes compressed sandstone (Arriscraft© type), which must also be cut, like natural stone.</p> <p>Note: When bricklayer-masons can be assisted by labourers, operations 3.4, 3.5, 3.6, 3.11, 3.16, 3.18 and 3.19 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.</p>		
Operations	Sub-Operations	Clarifications
3.1 Examine the work to be done	See operation 1.1	
3.2 Check materials, tools and equipment		
3.3 Groundwork	See operation 1.3	

TASK 3 LAY FREE STONE		
Operations	Sub-Operations	Clarifications
3.4 Erect scaffolds, if applicable		
3.5 Handle materials and install equipment		
3.6 Clean and prepare surfaces to be covered		
3.7 Check or install flashing		Occasionally the flashing is already installed.
3.8 Apply the paper or insulation ¹⁶		
3.9 Take measurements		
3.10 Scabble		Stones should be cut so as to obtain a uniform finish.
3.11 Mix the mortar	See operation 1.10	It is necessary to dose the quantity of water correctly to obtain the desired consistency. The mortar used for free stone should be more consistent than for brick; stone being heavier, the mortar must be consistent enough to support it.
3.12 Spread the mortar	See operation 1.12	
3.13 Lay corner stones		
3.14 Install the lines		

16. Referred to note No 14, p. 20.

TASK 3 LAY FREE STONE		
Operations	Sub-Operations	Clarifications
3.15 Lay stones, anchors and accessories, and attach or shim		To “attach or shim” consists of stabilizing the structure by using a pin or a wedge to temporarily immobilize stones that tend, because of their shape, not to stay in place.
3.16 Wash the stone		
3.17 Finish the joints		
3.18 Disassemble scaffolds, if applicable		
3.19 Restore the premises		
TASK 4 LAY ARCHITECTURAL PRECAST CONCRETE MEMBERS		
<p>Products and results</p> <p>Architectural members such as: bricks, blocks, aprons, lintels, keystones, abutments, corbels, modular stones, etc.</p> <p>Note: When bricklayer-masons can be assisted by labourers, operations 4.9 and 4.10 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.</p>		
Operations	Sub-Operations	Clarifications
4.1 Examine the work to be done	See operation 1.1	
4.2 Check materials, tools and equipment		
4.3 Guide the operator to position the members		This is the operator of hoisting equipment (e.g. a crane). To perform this operation, the bricklayer-mason must know the hoisting signals.

TASK 4 LAY ARCHITECTURAL PRECAST CONCRETE MEMBERS		
Operations	Sub-Operations	Clarifications
4.4 Install the lines, if applicable		
4.5 Do alignment and levelling work		
4.6 Install permanent anchors (welding, bolting)		The anchors may be fastened by welding or mechanically (bolts). Although welding is part of the bricklayer-mason's activities, the majority of participants mention that they tend to let it be done by a welder or by a bricklayer-mason who is used to this type of work. Most of the participants consulted therefore do not weld.
4.7 Remove temporary anchors		
4.8 Joint precast members		These are caulking joints, not mortar joints.
4.9 Wash the members		
4.10 Restore the premises		

TASK 5 REPAIR MASONRY

The most common causes of repairs are frost boils in walls, crumbling joints and brick, and deteriorating stairs, wall openings, keystones and aprons.

Various restoration techniques are used, for example the use of resurfacing mortar or, less frequently, placing natural stone anchored mechanically (or using epoxy-based products).

The participants include restoration work in this task. Repairs must be in line with the initial work. When performed on historic buildings, restorations are often governed by very strict (heritage) standards and require different working methods and materials, inherent to the existing structure's era.

Note: When bricklayer-masons can be assisted by labourers, operations 5.3, 5.4, 5.5, 5.10 and 5.11 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.

Operations	Sub-Operations	Clarifications
5.1 Examine the work to be done	See operation 1.1	It is particularly important here to ensure that the environment is safe. Work on damaged masonry can threaten the health and safety of the bricklayer-mason, clients, etc. Moreover, for this task, the work will frequently have fewer guidelines to follow, since it largely depends on the particular problem encountered. The bricklayer-mason must show initiative and resourcefulness, since contingencies may arise.
5.2 Check materials, tools and equipment		Given that needs vary according to the type of repairs, it is important to make sure to have the necessary tools.
5.3 Groundwork	See operation 1.3	
5.4 Erect scaffolds, if applicable		
5.5 Handle materials and install equipment		

TASK 5 REPAIR MASONRY		
Operations	Sub-Operations	Clarifications
5.6 Remove defective materials and empty the joints		
5.7 Clean and dampen surfaces		
5.8 Install the lines, if applicable		
5.9 Install repair members		
5.10 Disassemble scaffolds, if applicable		
5.11 Restore the premises		
TASK 6 MOUNT A FIREPLACE		
<p>Products and results</p> <p>Residential fireplaces: traditional, soapstone masonry, with a metal caisson, a combustion stove, a baking furnace, a barbecue, etc.</p> <p>The participants mentioned that this task is less and less frequent, because, among other reasons, most clients prefer to purchase prefabricated products and many municipalities prohibit or discourage the use of wood heating.</p> <p>Note: When bricklayer-masons can be assisted by labourers, operations 6.3, 6.4, 6.6, 6.10, 6.16 and 6.17 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.</p>		
Operations	Sub-Operations	Clarifications
6.1 Examine the work to be done	See operation 1.1	
6.2 Check materials, tools and equipment		

TASK 6 MOUNT A FIREPLACE		
Operations	Sub-Operations	Clarifications
6.3 Groundwork	See operation 1.3	
6.4 Erect scaffolds, if applicable		
6.5 Take measurements		
6.6 Handle materials and install equipment		
6.7 Prepare the base	6.7.1 Make sure the structure can bear the load	
6.8 Pour a concrete slab, if applicable ¹⁷	6.8.1 Produce forms 6.8.2 Prepare the cement 6.8.3 Pour the concrete in the form	Occasionally the concrete slab has already been poured, for example by the carpenter-joiner, when the bricklayer-mason arrives. This is often the case when the fireplace is built at the same time as the building.
6.9 Mark the fireplace's location		
6.10 Mix the mortar	See operation 1.10	
6.11 Lay back-up or refractory bricks or install the caisson, if applicable		Back-up bricks must follow the caisson's form, if applicable.
6.12 Install accessories		Examples of accessories: air shutter, ash trap.

17. The experts in the trade who participated in the workshop responded to the best of their knowledge and understanding of their trade and field of application. However, the CCQ's collective agreement application branch has issued a notice that, according to the *Regulation respecting the vocational training and qualification of manpower in the construction industry*, the carpenter-joiner or the cement finisher is responsible for this operation.

TASK 6 MOUNT A FIREPLACE		
Operations	Sub-Operations	Clarifications
6.13 Make the smoke chamber		The duct shape must be gradually shrunk to form the smoke chamber.
6.14 Erect the chimney		In the case of a natural fireplace, refractory and back-up bricks must be laid simultaneously.
6.15 Disassemble scaffolds, if applicable		
6.16 Restore the premises		
TASK 7 LAY CERAMIC WOOL, PLASTIC AND REFRACTORY BRICKS, AND ACID-PROOF BRICKS AND TILES		
<p>Products and results</p> <ul style="list-style-type: none"> - Wool is used in electric or gas fireplaces as insulation around furnaces or for the expansion joints. - Plastic is used as an interior finish for ceilings and furnace walls, boilers and related structures. - Refractory bricks are used inside conventional and rotary ovens, furnaces, chimneys, fireplaces and boilers. - Acid-proof bricks and tiles are used for finishing areas exposed to acids: tanks, floors, walls, reactor vessels, etc. <p>Before undertaking most of their work, bricklayer-masons who work with refractory products must generally request a work permit from plant managers. Lockout procedures are almost always necessary.</p> <p>Note: When bricklayer-masons can be assisted by labourers, operations 7.3, 7.4, 7.7 and 7.8 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.</p>		
Operations	Sub-Operations	Clarifications
7.1 Examine the work to be done	See operation 1.1	
7.2 Check materials, tools and equipment		
7.3 Erect scaffolds, if applicable		

TASK 7 LAY CERAMIC WOOL, PLASTIC AND REFRACTORY BRICKS, AND ACID-PROOF BRICKS AND TILES		
Operations	Sub-Operations	Clarifications
7.4 Handle materials and install equipment		
7.5 Install anchors	7.5.1 Clean the surfaces 7.5.2 Weld or bolt the anchors	
7.6 Lay out wool, plastic, refractory bricks or acid-proof bricks and tiles	7.6.1 Prepare the wool 7.6.2 Place the wool between anchors 7.6.3 Lay the plastic or bricks	
7.7 Disassemble scaffolds, if applicable		
7.8 Restore the premises		
TASK 8 SPRAY REFRACTORY SUBSTANCES		
<p>The refractory substances referred to are heat-resistant mortar or cement.</p> <p>Note: When bricklayer-masons can be assisted by labourers, operations 8.3, 8.4, 8.5, 8.12, 8.13 and 8.14 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.</p>		
Operations	Sub-Operations	Clarifications
8.1 Examine the work to be done	See operation 1.1	
8.2 Check materials, tools and equipment		
8.3 Erect scaffolds, if applicable		

TASK 8 SPRAY REFRACTORY SUBSTANCES		
Operations	Sub-Operations	Clarifications
8.4 Install the machines		
8.5 Handle the materials		It is important to keep materials at hand to avoid useless comings and goings.
8.6 Install feed pipes		
8.7 Check the operation of machines		Compressor, pipes, etc.
8.8 Install anchors	8.8.1 Clean the surfaces to be welded 8.8.2 Weld the anchors	
8.9 Ensure that the machine is supplied		
8.10 Apply the substances		
8.11 Equalize the surfaces	8.11.1 Remove excess substance	
8.12 Clean the machines		
8.13 Disassemble scaffolds, if applicable		
8.14 Restore the premises		

TASK 9 INSTALL REFRACTORY MEMBERS INSIDE ELECTROLYTIC CELLS

This task is performed mainly in aluminum smelters. The participants consider it to be specialized. The refractory members used are, for example, insulating bricks, carbon blocks, etc.

Note: When bricklayer-masons can be assisted by labourers, operations 9.2 and 9.11 are performed by the latter. In the absence of labourers, all the operations are performed by bricklayer-masons.

Operations	Sub-Operations	Clarifications
9.1 Examine the work to be done	See operation 1.1	
9.2 Handle the materials		
9.3 Install alumina bed rulers	9.3.1 Level	
9.4 Lay the alumina bed	9.4.1 Spread the alumina uniformly	
9.5 Remove alumina bed rulers		Nothing should be moved.
9.6 Install inter-cathode plates	9.6.1 Make the floor 9.6.2 Make brick tank heads	
9.7 Install cathode bars		This operation is performed with an electrician.
9.8 Finish bricklaying between cathodes	9.8.1 Take measurements	
9.9 Cement the cathodes		

TASK 9 INSTALL REFRACTORY MEMBERS INSIDE ELECTROLYTIC CELLS		
Operations	Sub-Operations	Clarifications
9.10 Lay the side slabs		These are carbon blocks.
9.11 Restore the premises		
9.12 Reline		Relining consists of coating with glaze the interior walls of an oven or hearth. Glaze is a refractory material used in metallurgy. It is a mixture of clay and piled coal.

2.3 ACHIEVEMENT CONDITIONS

Data on achievement conditions were collected for the bricklayer-mason trade as a whole. The data pertain to aspects such as work areas, work instructions, health and safety hazards, reference documents and material resources used, etc.

Table 2.3 Achievement Conditions

ACHIEVEMENT CONDITIONS
<p>Workplaces¹⁸</p> <p>Bricklayer-masons work indoors and outdoors, in all Quebec regions. They are likely to work on any type of residential, commercial, institutional or industrial building¹⁹, existing or under construction. They are called upon to work in areas difficult to access, confined and narrow spaces²⁰ with poor lighting, particularly in the case of bricklayer-masons who apply refractory materials. They may be exposed to extreme temperatures (heat or cold).</p>
<p>Instructions</p> <p>Generally, instructions are given verbally to the bricklayer-mason by the foreman. Occasionally the foreman gives the bricklayer-mason an excerpt of the plans and specifications, to specify some of the work. The client may also give the bricklayer-mason instructions.</p>
<p>Stress factors</p> <p>The work involves various stress factors related to:</p> <ul style="list-style-type: none">• working from heights;• the productivity requirement;• weather conditions, which sometimes make it impossible to work and thus to get paid;• extreme temperatures;• deadlines;• tight schedules;• the concern to do the work correctly;• the foreman's requirements;• the hazard of a structure collapsing (repairs);• working in confined spaces (particularly in applying refractory materials);• using hazardous products (in applying refractory materials).

18. Non-exhaustive list.

19. None of the participants works in the civil engineering and roadwork sector.

20. Work in confined spaces requires a permit.

ACHIEVEMENT CONDITIONS

Tools and equipment

Annex 1 of the present report contains a list of material resources used by bricklayer-masons in practicing their trade.

Health and safety hazards

Annex 1 of the present report contains a list of the main hazards related to the tasks and operations of the bricklayer-mason trade, as well as applicable preventive measures.

Degree of autonomy

Generally, bricklayer-masons work within a team, often a team of two. They are supervised by the foreman, who verifies their work regularly. For repair work, they are often assigned to work alone; the foreman's supervision is then less close.

Bricklayer-masons who apply refractory materials in the industrial sector are likely to be supervised by an inspector or a quality control manager for the plant in which they work.

References

The bricklayer-mason uses little written documentation. When doing so, the most common documents are:

- the Québec Building Code;
- the National building Code;
- WHMIS material safety data sheets²¹ for certain products;
- the data sheets for certain products and materials.

The bricklayer-mason may also refer to the distributor of certain products or materials, or to personnel of the quarry where the products he is to use originate.

Bricklayer-masons who apply refractory materials in the industrial sector have to consult data on previous work, the manufacturing data sheets of the installations, and the plans of the plant.

Decision-making

In the view of the participants consulted, the trade does not involve very elaborate decision-making processes, especially since the journeyman is generally well supervised by a foreman.

21. Information system regarding hazardous materials used at work.

2.4 PERFORMANCE CRITERIA

Performance criteria were gathered for each task. They are used for assessing whether the tasks were performed satisfactorily. The criteria pertain to aspects such as the quantity and quality of work done, the observance of a work procedure, the attitudes adopted, etc.

To draw a list of the requirements related to each task, the participants worked in teams of two or three. Their results were then collected and presented in full session. So some requirements may apply to other tasks as well as to those for which they were selected.

Table 2.4 Performance Criteria

TASK 1 LAY BRICKS AND BLOCKS	
Performance Criteria	
<ul style="list-style-type: none"> - Appropriate alignment and levelling of the work - Adequate anchors installed on an ongoing basis - Observance of starting instructions - Joint uniformity and aesthetic appearance - Presence of weepholes - Solid support from the aprons - Flashing laid appropriately - Vapour barriers repaired correctly, if applicable - Observance of the air space behind the work, if applicable 	<ul style="list-style-type: none"> - Efficient working method - Appropriate performance and productivity - Observance of the laying direction of blocks and bricks - Appropriate protection of adjacent surfaces - Cleanliness of the work and premises - Observance of the models, if applicable - Observance of applicable standards and regulations - Observance of health and safety rules - Harmonious and effective communication with co-workers
TASK 2 LAY SAWN ASHLAR, GLASS BLOCKS AND MANUALLY HANDLED PRE-CUT MEMBERS	
Performance Criteria	
<ul style="list-style-type: none"> - Appropriate alignment and levelling of the work - Adequate anchors installed on an ongoing basis - Observance of starting instructions - Joint uniformity and aesthetic appearance - Efficient working methods - Appropriate performance and productivity - Observance of the laying direction of blocks and bricks 	<ul style="list-style-type: none"> - Appropriate protection of adjacent surfaces - Extreme cleanliness of the work and premises - Observance of the models, if applicable - Observance of applicable standards and regulations - Observance of health and safety rules - Harmonious and effective communication with co-workers

TASK 3 LAY FREE STONE**Performance Criteria**

- Appropriate filling compaction
- Vertical joint lower than the highest stone
- Joint length less than 4 feet
- Solid structure
- Finishing the joints carefully
- Observance of aesthetic rules in choosing and arranging stones
- Absence of apparent defects (boxes, stairs, long vertical joints, etc.)
- Appropriate alignment and levelling of the work
- Following instructions
- Joint uniformity and aesthetic appearance
- Efficient working methods
- Appropriate performance and productivity
- Appropriate protection of adjacent surfaces
- Cleanliness of the work and premises
- Observance of applicable standards and regulations
- Observance of health and safety rules
- Harmonious and effective communication with co-workers

TASK 4 LAY ARCHITECTURAL PRECAST CONCRETE MEMBERS**Performance Criteria**

- Appropriate alignment and levelling of the work
- Installing anchors correctly
- Observance of starting instructions
- Joint uniformity and aesthetic appearance
- Efficient working methods
- Appropriate performance and productivity
- Correct arch diameter, if applicable
- Carefully verifying the quality of members
- Handling members appropriately
- Observance of applicable standards and regulations
- Observance of health and safety rules
- Appropriate protection of adjacent surfaces
- Cleanliness of the work and premises
- Observance of the models, if applicable
- Harmonious and effective communication with co-workers

TASK 5 REPAIR MASONRY**Performance Criteria**

- Harmonious fit with the existing structure
- Observance of colours and materials
- Prior documentation before working (photos, drawings)
- Following specific instructions (municipal, heritage)
- Appropriate alignment and levelling of the work
- Observance of starting instructions
- Uniform and aesthetic work
- Efficient working methods
- Appropriate performance and productivity
- Carefully finishing the work
- Appropriate protection of adjacent surfaces
- Cleanliness of the work and premises
- Observance of applicable standards and regulations
- Observance of health and safety rules

TASK 6 MOUNT A FIREPLACE**Performance Criteria**

- Good operation of installed accessories
- Making the smoke box appropriately
- Using appropriate products
- Well filled joints
- Meeting manufacturer standards, if applicable
- Observance of applicable standards and regulations (insurance, fire department, etc.)
- Appropriate alignment and levelling of the work
- Observance of starting instructions
- Joint uniformity and aesthetic appearance
- Efficient working methods
- Appropriate performance and productivity
- Finishing the joints carefully
- Appropriate protection of adjacent surfaces
- Cleanliness of the work and premises
- Observance of the models, if applicable
- Observance of health and safety rules
- Harmonious and effective communication with co-workers

TASK 7 LAY CERAMIC WOOL, PLASTIC AND REFRACTORY BRICKS, AND ACID-PROOF BRICKS AND TILES**Performance Criteria**

- Covering the burner wool adequately
- Meeting joint standards
- Welding anchors correctly
- Safe and efficient working methods
- Appropriate use of materials
- Appropriate alignment and levelling of the work
- Following instructions
- Appropriate performance and productivity
- Appropriate protection of adjacent surfaces
- Cleanliness of the work and premises
- Observance of applicable standards and regulations
- Observance of health and safety rules
- Harmonious and effective communication with co-workers

TASK 8 SPRAY REFRACTORY SUBSTANCES**Performance Criteria**

- Observance of application techniques
- Observance of proportions in the water-air-refractory substance mixture
- Uniform and sufficient thickness
- Effective coordination between the machine operator and the applicator
- Careful product verification (due date, appropriate product)
- Following instructions
- Efficient working methods
- Appropriate performance and productivity
- Appropriate protection of adjacent surfaces
- Cleanliness of the work and premises
- Observance of applicable standards and regulations
- Observance of health and safety rules
- Harmonious and effective communication with co-workers

TASK 9**INSTALL REFRACTORY MEMBERS INSIDE ELECTROLYTIC CELLS****Performance Criteria**

- | | |
|---|--|
| - Meeting joint standards | - Efficient working methods |
| - Handling products safely | - Appropriate performance and productivity |
| - Joint uniformity | - Appropriate protection of adjacent surfaces |
| - Using the machine correctly | - Cleanliness of the work and premises |
| - Relining the members carefully | - Observance of applicable standards and regulations |
| - Appropriate alignment and levelling of the work | - Observance of health and safety rules |
| - Following instructions | |

2.5 FUNCTIONS

Functions correspond to a set of related tasks. This set may be defined by the work's results or by a sequence of steps.

For the trade of bricklayer-mason, the participants agreed with the four functions presented below. Accordingly, the bricklayer-mason's work includes:

- a **masonry work** function grouping the following tasks:
 - Lay bricks and blocks;
 - Lay sawn ashlar, glass blocks and manually handled pre-cut members;
 - lay free stone;
 - lay architectural precast concrete members;
 - mount a fireplace;
 - lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles;
 - spray refractory substances;
 - install refractory members inside electrolytic cells;
- a **masonry repair** function pertaining to the following task:
 - Repair masonry.

3. QUANTITATIVE DATA ON TASKS

3.1 OCCURRENCE

Occurrence data concern the percentage of bricklayer-masons²² who perform a task in the same workplace. The data presented in the tables below are averages of the 12 participants' results. However, they provide information on tasks performed not only by the bricklayer-masons attending the workshop, but also by all bricklayer-masons working in the companies represented.

Table 3.1 Occurrence of Tasks

Task	Occurrence
1. Lay bricks and blocks	70.3%
2. Lay sawn ashlar, glass blocks and manually handled pre-cut members	60.0%
3. Lay free stone	55.0%
4. Lay architectural precast concrete members	46.7%
5. Repair Masonry	71.7%
6. Mount a fireplace	3.8%
7. Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles	29.2%
8. Spray refractory substances	25.8%
9. Install refractory members inside electrolytic cells	25.8%

22. The data include apprentices.

3.2 WORK TIME

Work time, also expressed in percentages, represents the average time allocated by participants to each task, on an annual basis.

Table 3.2 Work Time per Task

Task	Work Time
1. Lay bricks and blocks	41.4%
2. Lay sawn ashlar, glass blocks and manually handled pre-cut members	9.3%
3. Lay free stone	7.3%
4. Lay architectural precast concrete members	3.0%
5. Repair Masonry	9.4%
6. Mount a fireplace	1.9%
7. Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles	14.2%
8. Spray refractory substances	4.7%
9. Install refractory members inside electrolytic cells	8.8%
	100%

We note that Task 1, “Lay bricks and blocks”, occupies the highest percentage of the participants’ work time, at 41.4%. The rest of the work time is distributed between the 11 other tasks, with percentages ranging from 1.7% (Task 6, “Mount a fireplace”) to 14.2% (Task 7, “Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles”).

Moreover, an examination of the individual results reveals that two of the participants almost never perform Task 1. The work time of these two participants and of another one is distributed almost exclusively among Tasks 7, 8 and 9, involving refractory materials.

3.3 IMPORTANCE AND DIFFICULTY OF TASKS

The **importance** of a task is estimated according to the more or less harmful consequences of performing a task poorly or not at all. The importance is assessed according to the following scale:

1. Very important: Performing the task less successfully does not lead to consequences for the result's quality, the costs, health and safety, etc.;
2. Not very important: Poor execution of the task may entail minimal costs, lead to an unsatisfactory result or involve risks of injury, minor accidents, etc.;
3. Important: Poor execution of the task may entail substantial additional costs, injuries, accidents, etc.;
4. Very important: Poor execution of the task may entail very major consequences regarding costs, safety, etc.

A task's **difficulty** is assessed according to the following scale:

1. Very easy: The task involves little risk of error; it requires no notable physical or mental effort. Performing the task is less difficult than average;
2. Easy: The task involves a few risks of error; it requires minimal physical or mental effort;
3. Difficult: The task involves many risks of error; it requires a good physical or mental effort. Performing the task is more difficult than average;
4. Very difficult: The task involves a high risk of error; it requires substantial physical or mental effort. The task is among the most difficult in the trade.

The data presented in the table below are the average results for the bricklayer-masons who participated in the workshop.

Table 3.3 Importance and Difficulty of Tasks

Task	Importance	Difficulty
1. Lay bricks and blocks	3.2	1.8
2. Lay sawn ashlar, glass blocks and manually handled pre-cut members	3.7	2.6
3. Lay free stone	3.6	2.8
4. Lay architectural precast concrete members	4.0	2.6
5. Repair Masonry	3.0	1.8
6. Mount a fireplace	3.5	2.7
7. Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles	3.7	2.8
8. Spray refractory substances	2.7	3.5
9. Install refractory members inside electrolytic cells	3.8	2.8

4. KNOWLEDGE, SKILLS AND ATTITUDES

The vocational analysis enabled us to specify some of the knowledge, skills and attitudes necessary for performing the tasks. Those qualities are transferable, i.e., applicable to a variety of tasks and situations.

The following pages present the knowledge, skills and attitudes that, according to the workshop participants, are considered essential for performing the tasks.

4.1 KNOWLEDGE

Mathematics

Bricklayer-masons have to apply some mathematical knowledge in practicing their trade. Geometry is particularly important for calculating areas and angles. They often also evaluate dimensions (size, width) with fractions and decimals, in the imperial and metric systems. Arithmetic is also useful to bricklayer-masons in calculating necessary materials and equipment.

Bricklayer-masons also perform gauging that consists of calculating, based on a wall's final height, the necessary thickness of mortar joints. Setting boundaries also requires calculations, to determine the number of necessary bricks per row to fit a specific length (window sill, door frame, a structure's total length, etc.).

Communication

The participants agree that the quality of communication between co-workers and supervisors alike is essential to an agreeable work environment. Bricklayer-masons generally work within a team, so they must be able to establish harmonious interpersonal relations, so as to correctly interpret their instructions and provide data pertaining to the work to be done. Respect for others is mentioned as one of the most important aspects of communication between colleagues.

Aesthetics

Bricklayer-masons must be able to judge the aesthetic aspect of a structure; this aspect does not depend only on applying standards or regulations. Beyond the observance of regulations inherent in the trade, meeting certain subjective criteria confers greater quality to the work done. This aesthetic concern particularly applies to repairs, and even more so to restorations. This involves, for instance, the harmonization of original and repair colours with the careful finishing of joints, the use of working methods compatible with the building's construction era, etc. Although relevant to all sectors, this aspect is especially important in the residential sector: clients are often reassured when they observe that the bricklayer-mason is preoccupied with aesthetics.

Laws and regulations

Bricklayer-masons must know the standards, laws and regulations governing the work they are assigned to do. Although they infrequently consult reference works, they learn these requirements by talking with co-workers and foremen as various types of work arise.

The knowledge of laws and regulations applicable to bricklayer-masons is mainly related to:

- building laws, regulations and standards, as described in Section 1.5 of the present report;
- safety measures related to individual protection equipment (boots, hard hat, etc.);
- regulations specific to the work to be done (e.g. municipal by-laws regarding fireplaces);
- the various regulations regarding plants where they are assigned to work;
- lock-out rules in the industrial sector;
- safety rules for work in confined spaces.

Plans and specifications

Reading plans and specifications is generally the foreman's responsibility. However, the bricklayer-mason may be called upon to read plans and specifications, for example if the nature of the work requires the foreman to explain to him certain aspects with the aid of a plan, or if he has to do some work alone, without the foreman's assistance.

Accordingly, the bricklayer-mason must know how to read plans and specifications, since he may have to do so on occasion. Moreover, at times he may have to draw small sketches by hand to explain his work to a colleague, the foreman or a client.

Occupational health and safety

Knowledge and application of basic occupational safety and WHMIS²³ rules are essential. Bricklayer-masons must act safely in doing their work. Annex 2 presents a grid of occupational health and safety points related to the tasks and operations of bricklayer-masons.

4.2 SKILLS

Skills are types of know-how. They are divided into three categories: cognitive, motor and perceptual.

Cognitive skills

Cognitive skills pertain to intellectual strategies applied in working. Bricklayer-masons must have the following main cognitive skills:

- anticipate, plan for results
- problem-solving
- demonstrate common sense, judgement

Motor skills

Motor skills involve gestures and movements. The main motor skills necessary to the trade of bricklayer-masons are the following:

- good physical capacity and strength
- good coordination, to perform several operations simultaneously and continuously
- dexterity
- efficient working methods (absence of useless movements or gestures)

23. Information system regarding hazardous materials used at work.

- capacity to make repetitive movements
- flexibility
- absence of vertigo, which would make practicing the trade difficult, if not impossible in some cases

Perceptual skills

Perceptual skills are sensory skills enabling a person to perceive by his senses what is happening in his environment. The main perceptual skills necessary to the bricklayer-mason trade are the following:

- visual acuity, to work in poorly lit areas
- ability to distinguish colours, to reproduce models
- ability to perceive sounds and recognize noises, for safety purposes

4.3 ATTITUDES

Attitudes are ways of acting, reacting and relating with others or with one's environment. They involve personal skills. The main attitudes necessary to the bricklayer-mason trade are the following:

- ability to listen, to take advice from more-experienced colleagues
- sense of observation
- interest in learning
- autonomy and initiative
- respect for others and open-mindedness
- interest in the trade
- patience and perseverance
- conscientiousness
- capacity to admit one's mistakes

5. TRAINING SUGGESTIONS

The participants in the workshop made suggestions about the various aspects of initial training. Those suggestions are:

- All the participants agreed that a stage would be very important to the training of future bricklayer-masons.
- A few participants mentioned that a stage as masonry labourer would also be positive, in enabling future bricklayer-masons to better understand the requirements of this work.
- Opinions are divided about prerequisites for training in the bricklayer-mason trade: some participants would like the requirements to be tightened, to ensure that candidates have sounder general training; other participants state that candidates with a secondary 5 education would no doubt prefer to practice another trade, and that tightening the requirements would lead to a loss of clientele.
- According to some participants, the content of the current program should be revised in part, to better reflect the realities of the trade. It would be preferable to attach more importance and spend more time on learning the basics of the trade (laying bricks and blocks, handling a trowel, etc.), rather than on certain tasks that are performed only on occasion (welding, reading plans, *crazy work*, etc.).
- Other participants consider it important to maintain the training's "versatile" aspect.
- It is essential to present the realities of the trade to future bricklayer-masons, while insisting on the specific context of work on construction sites, with its positive aspects and its more difficult ones.

Annexes

Annex 1
TOOLS AND EQUIPMENT

During the workshop, the participants were shown lists of raw materials, tools and equipment from the 1987 work situation analysis²⁴. In the following pages is, for each task, the list of raw materials, tools and equipment that was validated by the participants.

Table A1 Tools and Equipment

A. HAND TOOLS		
Tarpaulin (tarp)	curry comb	grease gun
broom	manual splitter	staple gun
water drum	template	grout bag
pry bar	scraper	trammel point
whitewash brush	socket set / wrench	portable sprayer
brush	round-nose trowel	scraper
wheelbarrow	diamond or abrasive disk	extension cord
shims/spacers	slicker	trimmer
calculator	hammers	mortar hoe
chisel	– dead blow	fret saw
chisels	– face	portable masonry saw
– toothed	– claw	hacksaw
– tuck pointer	– pick	water drum
– splitting	– bush	C-clamps
– brick set	– brick	shim driver
– straight	– axe	spatula
– pointed	– rubber mallet	slicer
– plugging	– sledge hammer	line holder
adjustable wrench	– mash	line stretcher
toolkit	– refractory	screwdriver
boltcutter	jointer	pallet jack
knife	level	trowels
sandscreen	venting tool	– duck billed
handsaw	wooden pallet	– bucket
jointer	shovel	– buttering
drill	brick tongs	– pointing
plastic trimmer	pliers	– margin
sling	line pin	– mason's
sponge	caulking tool	– gauge
	stud gun	water hose
		plugging chisel

24. Ministère de l'Éducation, *Briqueur-maçon : rapport d'analyse de la situation de travail*, Québec City, 1989.

B. POWER, HYDRAULIC AND PNEUMATIC, POWDER-ACTUATED, AND WELDING TOOLS AND EQUIPMENT		
vacuum cleaner	manual or hydraulic guillotine	pneumatic gun
mortar silo	spraying machine	grout pump
pneumatic chisel	mortar mixer	arc welder
blow torch	air sock	pressure washer
acetylene torch	jackhammer	grinder
mortar buggy	pneumatic hammer	masonry table saw
dolly / pump jack	hammer drill	circular saw
propane and diesel heater	powder-actuated fastening tools	jigsaw
hydraulic splitter	chain block	mortar silo
pneumatic chisel	percussion drill	hydraulic winch
compressor	reversible drill	pneumatic hose
coupler	air gun	vibrator
diamond or abrasive disk generator	grout gun	
C. PERSONAL PROTECTIVE EQUIPMENT AND SAFETY EQUIPMENT		
fresh air respirator	fire extinguisher	face shield
safety harness and fall arrest system	gloves	gas detection equipment
safety boots / footwear	insulated gloves	heat and cold protection
hard hat	safety vest	hearing protection
helmet muffs	safety harness	respiratory protection
fire blanket	goggles	tile saw with vacuum apron
skin barrier cream	leather protection jacket (welding)	
air wash station	cartridge respirator	
lock-out tags / locks		
D. MEASURING AND LAYOUT TOOLS AND EQUIPMENT		
line block	gauge rod / storey pole	mason's spacing rule
chalk line	laser level	bricklayer's tape
mason's line	mason's level	spark tester
square	elastic clip	tachometer
plumb-bob	straightedge	
E. HOISTING AND LIFTING EQUIPMENT AND SCAFFOLDING		
stone clamp	ladder	chain hoist
hand cart	elevator	spreader beam
forklift	sling	powered boom platform
Lewis pin	stairs	push-around powered platform
bracing	shoring	suspended platform
scaffolding	boom lift	scissor lift
– Jack-up	crane	fork extension
– hydraulic	plank	bosun's chair
– tubular	shackle	roof winch
– swing stage	block and tackle	electric winch
suspended scaffold	work cages	

OCCUPATIONAL HEALTH AND SAFETY GRID

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Table A2 Bricklayer-masons' Occupational Health and Safety Issues

No.	Risk Sources	Effects on Health and Safety	Means of Prevention
1	<p>Ground fall hazards</p> <ul style="list-style-type: none"> • Condition of the premises (clutter, risk of tripping over obstacles such as rejects, debris, extension cords, pipes, materials) • Slippery surfaces (rain, ice, snow, residues, dust, oil) • Holes 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains 	<ul style="list-style-type: none"> • Clean the workplace (picking up debris). • Hang up any equipment that might constitute an obstacle 2.1 m high or protect the walking area. • Apply abrasives to make the surface less slippery. • Absorb oils, recover water. • Level the ground. • Plug holes (install plating).
2	<p>Fall-from-height hazards</p> <p>2 a) • Using a stepladder</p> <p>2 b) • Using a ladder</p>	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Use a class 1 stepladder with a nominal capacity of 113 kg (250 lb.) and: <ul style="list-style-type: none"> - open the spreader bars completely; - install on a firm level surface; - choose a model according to the required height. • Use a class 1 stepladder. • Position and maintain a slope of 1/4 to 1/3 from the height of the bearing point. • Climbing up and down a ladder: <ul style="list-style-type: none"> - always with three support points; - hold the bars and not the side rails; - remain between the side rails; - do not hold anything in the hands; - face the ladder.

No.	Risk Sources	Effects on Health and Safety	Means of Prevention
2 c)	<ul style="list-style-type: none"> • Using small mobile scaffolding (Baker) 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Apply stability principles: <ul style="list-style-type: none"> - Never exceed three times the smallest support base; - Always use the wheel locking mechanism; - Climb down mobile scaffolding to move it.
2 d)	<ul style="list-style-type: none"> • Using metal frame scaffolding or tubular, socket and rosette scaffolding 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Stabilizing the scaffolding: <ul style="list-style-type: none"> - use stabilizers on the ground; - tie it to the building; - use guys; - place the two side rails side by side and fasten them by wind bracing. • When there is a risk of falling more than 3 metres: <ul style="list-style-type: none"> - install a railing system of the type developed by the Association des entrepreneurs en maçonnerie du Québec (AEMQ); or - wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN; or - be attached to a vertical lifeline complying with the specifications in the <i>Safety Code for the construction industry</i>. • Check the bearing capacity of the ground. • install beds and jack screws if the ground is sloped. • For each scaffolding section, install vertical locks. • Use safe means of access. • Install anchors to the structure at intervals not exceeding 3 times the minimum scaffolding width. • Make sure that the planks carry the NLGA seal of approval, that the floor is wide enough (min. 470 mm) and that the distance between the structure and the floor is less than 350 mm.

No.	Risk Sources	Effects on Health and Safety	Means of Prevention
2 e)	<ul style="list-style-type: none"> • Using an aerial automotive work platform 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Took the training required by safety standards. • Wear an energy-absorbing harness for the jib boom platform. • Delimit the work area to avoid the risk of collision. • Keep the feet on the platform floor. • Climb up and down facing the equipment, with 3 support points. • Keep the platform access and floor clean.
2 f)	<ul style="list-style-type: none"> • Using tower or platform scaffolding (Fraco or other) 	<ul style="list-style-type: none"> • Collisions • Contusions • Bruises • Fractures • Sprains • Internal injuries • Psychological and physical after-effects • Paralysis • Death 	<ul style="list-style-type: none"> • Comply with standards, capacities and an installation plan provided by an engineer.
3	<p>Chemical hazards</p> <ul style="list-style-type: none"> • Epoxy cement mixtures • Corrosive effects of cement and mortar • Hydrochloric acid • Silica dust • Muller sanding • Cutting blocks or bricks • Drilling anchoring holes • Welding smoke • Use of products such as silicone, refractories, sealers 	<ul style="list-style-type: none"> • Skin problems (dermatosis) • Carbon monoxide poisoning • Corrosive burns • Respiratory illnesses 	<ul style="list-style-type: none"> • Took WHMIS training. • Keep the specification sheets of products used. • Carry respiratory protection and filters appropriate to contaminants. • Ensure mechanical or natural ventilation. • Wear personal protective equipment (gloves, coveralls). • Wear safety glasses or a visor. • Use a tile saw or a dust vacuum system. • Use tools equipped with a vacuum system including a HEPA filter. • Have emergency equipment at hand (eye-wash station, fire extinguisher, etc.).

No.	Risk Sources	Effects on Health and Safety	Means of Prevention
4	Ergonomic hazards <ul style="list-style-type: none"> • Posture constraints / static • Repeated movements • Handling • Difficulty of the task • Weight of stones and concrete blocks • Vibrations (hand-arm system) 	<ul style="list-style-type: none"> • Musculoskeletal lesions • Sprains • Hernias • Fatigue, discomfort, pain • Tendinitis, etc. 	<ul style="list-style-type: none"> • Rotate tasks if the situation allows it. • Use handling equipment. • Know handling techniques. • Favour the purchase of tools limiting vibrations to a minimum.
5	Electrical hazards <ul style="list-style-type: none"> • Contact with an overhead electric line • Electric tools • Contact with electric wires or outlets 	<ul style="list-style-type: none"> • Electrification • Fibrillation • Burns • Amputation • Paralysis • Electrocutation • Death 	<ul style="list-style-type: none"> • Maintain the minimum distances of approach prescribed by the <i>Safety Code for the construction industry</i>. • Establish and comply with the agreement entitled <i>Convention – Intervention près des lignes électriques</i> with the operating company. • Use tools featuring double insulation or grounding. • Use extension cords in good condition and ground protections. • Cut the energy source, and then lock out and identify the components. • Took the compulsory training for working near electric lines.
6	Noise hazards <ul style="list-style-type: none"> • Tools • Anchoring in an angle iron • Cement mixer • Handling scaffoldings • Breaking stones, blocks or bricks 	<ul style="list-style-type: none"> • Hearing loss • Occupational deafness 	<ul style="list-style-type: none"> • Choose the most silent equipment possible. • Do required preventive maintenance. • Wear hearing protection (plugs or shells).
7	Mechanical hazards <ul style="list-style-type: none"> • Moving parts • Broken blade, drill bit or tool 	<ul style="list-style-type: none"> • Contusions • Fractures • Crushing • Amputation • Cuts 	<ul style="list-style-type: none"> • Comply with the regulatory grid regarding protection from machines. • Do required preventive maintenance. • Collect information and take training in the use of new tools.

No.	Risk Sources	Effects on Health and Safety	Means of Prevention
8	Environmental hazards <ul style="list-style-type: none"> • Extreme temperature (cold or hot) • Confined spaces 	<ul style="list-style-type: none"> • Discomfort due to cold • Chilblains • Hypothermia • Heat constraints • Heatstroke 	<ul style="list-style-type: none"> • Comply with health and safety rules. • Ensure adequate ventilation of work areas. • Do preventive maintenance of gas equipment. • Take training in the hazards of carbon monoxide and nitrogen dioxide. • Alternate work and rest periods. • Drink water.
9	Stress-related hazards <ul style="list-style-type: none"> • Quality of the finish • Application time • Application productivity 	<ul style="list-style-type: none"> • Health problems • Hypertension • Eczema 	<ul style="list-style-type: none"> • Plan the work. • Limit work done under pressure. • Avoid rush hours when performing tasks near road traffic.

Table A3 Risk Sources Related to Bricklayer-masons' Tasks and Operations

Legend

0	The risk is nil
+	The risk is low
++	The risk is average
+++	The risk is high

Risk levels are noted according to exposure to risk sources, not according to the gravity of effects on personal health and safety.

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards
Task 1 Lay bricks and blocks										
1.1	Examine the work to be done									
1.1.1	Receive verbal instructions from the foreman	0	0	0	0	0	0	0	0	+
1.1.2	Examine the plan, if applicable	0	0	0	0	0	0	0	0	0
1.1.3	Ensure the safety of the premises	++	+	+	+	+	+	+	++	+
1.1.4	Coordinate your work with that of other trades, if applicable	++	+	+	+	+	+	+	+	+
1.2	Check materials, tools and equipment									
		++	+	+	+	++	+	++	++	++
1.3	Groundwork									
1.3.1	Clear the ground of any debris	+++	+	+++	+++	+	++	+	+	+
1.3.2	Level the ground	++	0	++	++	0	+	+	+	0
1.3.3	Ensure the ground is solid	++	+	+	+	0	0	0	+	0
1.3.4	Protect surrounding areas	+++	+++	+	+	++	+	+	+	+
1.4	Erect scaffolds, if applicable									
		+++	+++	+	+++	+	++	+	+	+
1.5	Handle materials and install equipment									
		+++	+++	++	++	++	++	+	++	+
1.6	Clean and prepare surfaces to be covered									
		+++	++	+++	+++	0	+	+	+	0
1.7	Lay flashing, if applicable									
		+++	++	++	++	0	0	0	0	0
1.8	Put the paper and insulation in place, if applicable									
1.8.1	Unroll the paper on the surface	++	++	++	+	0	0	0	0	0
1.8.2	Fasten the paper with staples or nails	+	++	+	++	0	+	0	0	+
1.8.3	Seal the connections	+	+	+	++	0	0	0	0	0
1.8.4	Apply insulation sheets	+	+	+	++	0	0	0	0	0
1.8.5	Seal the space between sheets	+	+	+	+	0	0	0	0	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards
1.9	Take measurements, if applicable									
1.9.1	Check the height of openings (doors, windows, etc.)	++	++	+	++	0	0	0	0	0
1.9.2	Check the gauge of bricks or blocks	++	++	+	++	0	0	0	0	0
1.9.3	Determine joint thickness by distributing available space	++	++	+	+	0	0	0	0	0
1.9.4	Evaluate the angle of arches, if applicable	++	++	+	+	0	0	0	0	0
1.10	Mix the mortar									
1.10.1	Obtain clean water	+++	+++	0	+++	+	0	0	+	0
1.10.2	Add colorant, if applicable	+++	++	+++	+++	+	+	+	+	0
1.10.3	Obtain sand with appropriate granulation, if applicable	++	++	+	+++	0	0	+	+	0
1.10.4	Dose the ingredients, if applicable	+++	+++	+++	+++	+	+	+	+	0
1.10.5	Mix mortar and water in the mixer	++	+	+++	+++	++	++	+++	++	+
1.10.6	Proceed to mix	++	++	+++	+++	+	++	++	++	++
1.10.7	Observe the mixing time	+	+	+++	++	0	++	++	+	++
1.10.8	Observe the setting time	+	+	++	+	0	0	+	++	++
1.10.9	Finish mixing	++	++	+++	+++	0	+	+	+	++
1.11	Install the lines									
1.11.1	Hang the corner line	++	+++	+	+	+	0	0	0	+
1.11.2	Link the corner line on each row by the centre line	++	++	+	+	0	0	0	0	0
1.12	Spread the mortar									
1.12.1	Check that the base is clean and devoid of any particles	++	+	+	+	0	0	0	0	0
1.12.2	Spread on the rows of bricks or blocks	++	++	+++	+++	0	0	0	0	0
1.12.3	Make beads and grooves	++	++	++	+++	0	0	0	0	0
1.12.4	Remove mortar fallen in the back	++	+	+++	++	0	0	0	0	+
1.12.5	Recover excess mortar	++	+	++	++	0	0	0	0	+
1.13	Lay corner bricks or blocks	++	+++	++	+++	0	0	0	0	+
1.13.1	Make markers	+	++	+	++	0	0	0	0	+
1.13.2	Lay corner bricks	+	+++	++	+++	0	0	0	0	+
1.13.3	Place the line on the row	++	++	+	+	0	0	0	0	+
1.14	Lay the first row of bricks or blocks	+	+	0	++	0	0	0	0	+
1.14.1	Leave empty joints for the weepholes	+	+	0	0	0	0	0	0	0
1.15	Install anchors	+	++	+	++	0	0	+	0	0
1.16	Lay flashing, if applicable	+	+	+	++	0	0	0	0	0
1.17	Install reinforcements, if applicable	+	+	+	++	0	0	+	0	0
1.18	Lay bricks or blocks and put accessories in place	++	++	+	+++	0	0	0	0	+

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards
1.19	Finish the joints									
1.19.1	Smooth the joints	++	++	++	+++	0	0	0	0	0
1.19.2	Brush the masonry work	++	++	++	+++	0	0	0	0	0
1.20	Install expansion and caulking joints									
1.20.1	Place a backer rod in the cavity	+	+	0	+	0	0	0	0	0
1.20.2	Cover with silicone	+	+	++	+	0	0	0	0	0
1.21	Install retaining anchors	+	++	+	++	0	+	+	0	0
1.21.1	Fasten angle irons on the structure (welding or mechanical anchoring)	+	++	+	++	0	+	+	0	0
1.22	Wash bricks or blocks	++	++	+	++	0	0	0	0	0
1.23	Disassemble scaffolds, if applicable	++	+++	+	+++	+	+	0	+	0
1.24	Restore the premises	++	++	++	+	0	0	0	0	0
Task 2 Lay sawn ashlar, glass blocks and manually handled pre-cut members										
2.1	Examine the work to be done									
2.1.1	See operation 1.1	0	0	0	0	0	0	0	0	+
2.2	Check materials, tools and equipment	++	+	+	+	++	+	++	++	++
2.3	Groundwork									
2.3.1	See operation 1.3	+++	+	++	+++	0	+	+	0	0
2.4	Erect scaffolds, if applicable	+++	+++	+	+++	+	+	+	+	+
2.5	Handle materials and install equipment	+++	+++	++	+++	0	+	+	+	0
2.6	Clean and prepare surfaces to be covered	+++	++	+++	+++	0	0	+	+	0
2.7	Check or install flashing									
2.7.1	Depending on the type, glue or staple the flashing	+++	++	++	++	0	0	0	0	0
2.8	Apply the paper or insulation									
2.8.1	Place the paper	++	++	++	+	0	0	0	0	0
2.8.2	Staple or nail the insulation	+	++	+	++	0	0	0	0	0
2.8.3	Seal the joints	+	+	+	++	0	0	0	0	0
2.9	Take measurements									
2.9.1	Check the height of each opening	++	++	+	++	0	0	0	0	+
2.9.2	Gauge the height of each corner	++	++	+	++	0	0	0	+	+
2.10	Mix the mortar									
2.10.1	See operation 1.10	+++	+++	+++	+++	0	0	0	0	+
2.11	Spread the mortar									
2.11.1	See operation 1.12	++	++	+++	+++	0	0	0	0	0
2.12	Lay corner stones, blocks or members	++	+++	++	+++	0	0	0	0	+
2.13	Install the lines	++	++	+	+	0	0	0	0	+

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards
2.14	Complete the first row	+	+	0	+	0	0	0	0	+
2.15	Install anchors and accessories, if applicable	+	++	+	++	0	+	+	0	0
2.16	Mount the structure, clean and equalize the joints									
2.16.1	Remove excess mortar	++	+	++	++	0	0	0	0	0
2.17	Install expansion joints									
2.17.1	Place a backer rod in the cavity	+	+	0	+	0	0	0	0	0
2.17.2	Cover with silicone	+	+	++	++	0	0	0	0	0
2.18	Finish the joints									
2.18.1	Finish the joints at mid-height of the work	++	++	++	+++	0	0	0	0	0
2.19	Wash stones, blocks or members	++	++	+	++	+	+	0	+	0
2.20	Disassemble scaffolds, if applicable	++	+++	+	+++	+	+	+	+	+
2.21	Restore the premises	++	++	++	+	0	+	+	0	0
Task 3 Lay free stone										
3.1	Examine the work to be done									
3.1.1	See operation 1.1	0	0	0	0	0	0	0	0	0
3.2	Check materials, tools and equipment	++	+	+	+	+	+	0	0	0
3.3	Groundwork									
3.3.1	See operation 1.3	+++	+	++	+++	+	+	0	0	0
3.4	Erect scaffolds, if applicable	+++	+++	+	+++	+	+	+	0	0
3.5	Handle materials and install equipment	+++	+++	++	+++	++	++	+	+	+
3.6	Clean and prepare surfaces to be covered	+++	++	+++	+++	0	+	+	+	0
3.7	Check or install flashing	+++	++	++	++	0	0	0	0	0
3.8	Apply the paper or insulation	++	++	++	+	0	0	0	0	0
3.9	Take measurements	++	++	+	++	0	0	0	0	+
3.10	Scabble	+++	++	+	+++	0	++	++	+	+
3.11	Mix the mortar									
3.11.1	See operation 1.10	+++	+++	+++	+++	0	+	0	0	0
3.12	Spread the mortar									
3.12.1	See operation 1.12	++	++	+++	+++	0	0	0	0	0
3.13	Lay corner stones	++	+++	+++	+++	0	0	0	0	++
3.14	Install the lines	++	++	+	+	0	0	0	0	+
3.15	Lay stones, anchors and accessories, and attach or shim	++	++	+	+++	0	+	0	0	+
3.16	Wash the stone	++	++	+	++	0	0	0	0	0
3.17	Finish the joints	++	++	++	+++	0	0	0	0	0
3.18	Disassemble scaffolds, if applicable	++	+++	+	+++	+	+	+	+	+
3.19	Restore the premises	++	++	++	+	0	0	0	0	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards
Task 4 Lay architectural precast concrete members										
4.1	Examine the work to be done									
4.1.1	See operation 1.1	0	0	0	0	0	0	0	0	+
4.2	Check materials, tools and equipment	++	++	+	++	0	0	0	0	0
4.3	Guide the operator to position the members	++	+++	+	++	0	0	+	0	++
4.4	Install the lines, if applicable	++	+++	+	++	0	0	+	0	+
4.5	Do alignment and levelling work	++	+++	+	+++	0	0	+	+	++
4.6	Install permanent anchors (weld, bolt)	++	+++	+	+++	+	++	+	+	+
4.7	Remove temporary anchors	++	+++	+	+++	0	0	0	0	+
4.8	Joint precast members	++	+++	++	+++	0	0	0	0	++
4.9	Wash the members	++	+++	+	++	+	0	0	+	+
4.10	Restore the premises	++	++	++	+	0	0	0	0	0
Task 5 Repair Masonry										
5.1	Examine the work to be done									
5.1.1	See operation 1.1	++	+++	++	+	0	0	0	0	+
5.2	Check materials, tools and equipment	++	++	++	+++	+	+	+	+	+
5.3	Groundwork									
5.3.1	See operation 1.3	+++	+	++	+++	+	+	+	+	+
5.4	Erect scaffolds, if applicable	+++	+++	+	+++	+	+	+	+	+
5.5	Handle materials and install equipment	+++	+++	++	+++	+	+	+	+	+
5.6	Remove defective materials and empty the joints	+++	+++	++	+++	+	+	+	0	0
5.7	Clean and dampen surfaces	+++	+++	++	++	0	0	0	0	0
5.8	Install the lines, if applicable	++	+++	+	+++	0	0	0	0	0
5.9	Install repair members	++	+++	++	+++	0	0	0	0	0
5.10	Disassemble scaffolds, if applicable	++	+++	+	+++	+	+	+	0	+
5.11	Restore the premises	++	++	++	+	0	0	0	0	0
Task 6 Mount a fireplace										
6.1	Examine the work to be done									
6.1.1	See operation 1.1	0	0	0	0	0	0	0	0	+
6.2	Check materials, tools and equipment	++	+	+	+	0	0	0	0	0
6.3	Groundwork									
6.3.1	See operation 1.3	+	+	++	+++	0	0	0	0	0
6.4	Erect scaffolds, if applicable	++	++	+	+++	+	+	+	0	0

No.	Tasks and Operations	Ground Fall Hazards	Fall-from-Height Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards	Mechanical Hazards	Environmental Hazards	Stress-Related Hazards
6.5	Take measurements	++	++	+	++	0	0	0	0	0
6.6	Handle materials and install equipment	+++	+++	++	+++	+	+	+	+	+
6.7	Prepare the base									
6.7.1	Make sure the structure can bear the load	++	++	+	++	0	0	0	+	++
6.8	Pour a concrete slab, if applicable									
6.8.1	Produce forms	++	+	++	++	0	+	+	+	+
6.8.2	Prepare the cement	+	0	++	+++	0	+	+	+	0
6.8.3	Pour the concrete in the form	+	+	++	+++	0	+	+	0	+
6.9	Mark the fireplace's location	+	+	+	++	0	0	0	0	0
6.10	Mix the mortar									
6.10.1	See operation 1.10	++	++	++	+++	0	0	0	0	+
6.11	Lay back-up or refractory bricks or install the caisson, if applicable	++	+	+++	+++	+	+	+	+	+
6.12	Install accessories	++	++	++	+++	+	+	0	+	+
6.13	Make the smoke chamber	++	+	+++	+++	+	0	0	0	+
6.14	Erect the chimney	++	+++	++	+++	0	0	0	0	+
6.15	Disassemble scaffolds, if applicable	++	+++	+	+++	+	+	+	+	+
6.16	Restore the premises	++	++	++	+	0	0	0	0	0
Task 7 Lay ceramic wool, plastic and refractory bricks, and acid-proof bricks and tiles										
7.1	Examine the work to be done									
7.1.1	See operation 1.1	0	0	+	0	0	0	0	0	+
7.2	Check materials, tools and equipment	++	+	++	+	0	0	0	0	+
7.3	Erect scaffolds, if applicable	++	++	+	+++	+	+	+	+	+
7.4	Handle materials and install equipment	+++	+++	+++	+++	+	+	+	++	+
7.5	Install anchors									
7.5.1	Clean the surfaces	++	++	+++	+++	+	+	0	0	0
7.5.2	Weld or bolt the anchors	++	+++	+++	+++	+	+	0	+	0
7.6	Lay out wool, plastic, refractory bricks or acid-proof bricks and tiles									
7.6.1	Prepare the wool	++	++	+++	++	0	0	0	0	0
7.6.2	Place the wool between anchors	++	++	+++	++	0	0	0	0	0
7.6.3	Lay the plastic or bricks	++	++	+++	+++	0	0	0	0	0
7.7	Disassemble scaffolds, if applicable	++	+++	+	+++	+	+	+	+	+
7.8	Restore the premises	++	++	+++	+	0	0	0	0	0
Task 8 Spray refractory substances										
8.1	Examine the work to be done									
8.1.1	See operation 1.1	0	0	+	0	0	0	0	+	0
8.2	Check materials, tools and equipment	++	++	+++	++	++	+	++	++	++

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8.3	Erect scaffolds, if applicable	++	++	+	+++	+	++	+	+	+
8.4	Install the machines	++	++	+	+++	++	++	+	++	+
8.5	Handle the materials	++	++	+++	+++	++	++	+	++	+
8.6	Install feed pipes	++	++	++	+++	++	++	+	+	+
8.7	Check the operation of machines	++	++	++	++	++	++	+	++	+
8.8	Install anchors									
8.8.1	Clean the surfaces to be welded	++	++	+++	++	++	++	+	++	+
8.8.2	Weld the anchors	++	++	+++	++	++	++	+	++	+
8.9	Ensure that the machine is supplied	++	++	+++	+++	++	++	++	++	+
8.10	Apply the substances	++	+++	+++	+++	++	++	++	++	+
8.11	Equalize the surfaces									
8.11.1	Remove excess substance	++	++	+++	+++	++	++	++	++	+
8.12	Clean the machines	++	++	+++	++	++	++	++	++	+
8.13	Disassemble scaffolds, if applicable	++	+++	++	+++	+	+	0	+	0
8.14	Restore the premises	++	++	+++	+	0	0	0	0	0
Task 9 Install refractory members inside electrolytic cells										
9.1	Examine the work to be done									
9.1.1	See operation 1.1	0	0	+	0	0	0	0	+	0
9.2	Handle the materials									
9.2.1	See operation 1.5	++	++	+++	+++	++	++	+	++	+
9.3	Install alumina bed rulers									
9.3.1	Level	++	+	+++	+++	+	+	++	+	0
9.4	Lay the alumina bed									
9.4.1	Spread the alumina uniformly	++	+	+++	+++	+	+	++	+	+
9.5	Remove alumina bed rulers	++	+	+++	+++	+	+	++	+	+
9.6	Place plates between cathodes									
9.6.1	Make the floor	++	+	+++	++	0	+	+	+	0
9.6.2	Make brick tank heads	++	+++	+++	+++	0	+	+	+	0
9.7	Install cathode bars	++	++	+++	+++	0	+	+	+	0
9.8	Finish bricklaying between cathodes									
9.8.1	Take measurements	++	++	+++	+	0	+	+	+	0
9.9	Cement the cathodes	++	++	+++	++	0	+	+	+	0
9.10	Lay the side slabs	++	++	+++	++	0	+	+	+	0
9.11	Restore the premises	++	++	+++	+	0	0	0	0	0
9.12	Reline	++	+++	+++	+++	0	+	+	+	0