

Interior Systems Installer

Occupational Analysis Report

June 2010



Commission
de la construction
du Québec

The purpose of this report is to describe as accurately as possible the trade of interior systems installer 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 competencies 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 present report does not bind the Commission in any way. It has no legal effect and is meant as a reflection of discussions held on the date of the analysis workshop.

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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 industry trades².

The CCQ undertook this operation for many reasons, particularly the following:

- 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 analyses 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 Agreement on the Mutual Recognition of Professional Qualifications.

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

The occupational analysis for interior systems installers belongs to this context³. Its purpose is to describe the trade as currently practiced by journeymen 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 November 2 and 3, 2009.

This analysis aims to draw a portrait (tasks and operations) of the trade and its entry requirements, 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 trade. A special effort was made to include in this report all the data collected during the workshop and to ensure that the data accurately depict the realities of the trade analysed.

1. At the time of their development, in the eighties and nineties, they were called "work situation analyses".

2. The terms "profession" and "trade" are considered synonymous.

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 workforce in the construction industry, Schedule A, article 2, the term “interior systems installer” means:

[...] anyone who:

- a) prepares and sets all types of laths;
- b) prepares, assembles and sets any metal (tied or welded) used to erect and install metal supports for suspended ceilings;
- c) sets metal studs or frames for walls or partitions to be covered with metal, gypsum or similar composition laths or any wallboard or gypsum tile;
- d) installs gypsum or composition wallboard on partitions composed of metal studs, or on metal furrings;
- e) installs any wire mesh to be covered with any type of coating;
- f) sets acoustical tile.

Performance of the work described in the first paragraph includes trade-related handling for the purposes of immediate and permanent installation.

The participants estimate that this definition represents the practice of the trade well, except for the preparation and setting of laths. This task is less and less frequent and is performed only during the renovation of old buildings constructed with this type of material. Even though they cannot amend the regulation, some of the participants question the relevance of retaining paragraph *a* in the description of the trade. Following discussions, it was agreed that setting laths as mentioned in the regulation should be interpreted in the context of renovation work.

The participants also estimate that this description is incomplete, because it does not mention making layouts. All the participants think that this operation is essential and that it should be mentioned in paragraph *b*.

Moreover, they emphasize that welding as a fastening method is still infrequent but is bound to develop.

Finally, they mention that on some occasions, interior systems installers lay insulation.

1.2 JOB TITLES

The job title used for describing the practice of the trade in the present vocational analysis is “interior systems installer”, but in some environments we sometimes hear the term “drywall applicator”. According to the participants, this job title is inaccurate because it describes only one part of the work.

The participants comment that they often have to explain the nature of their activities, since the words “interior systems” are vague. Unfortunately, no other terms describe the work better.

The job titles not to be confused with the trade of interior systems installer are:

- plasterer;
- carpenter-joiner.

1.3 SECTORS OF ACTIVITY

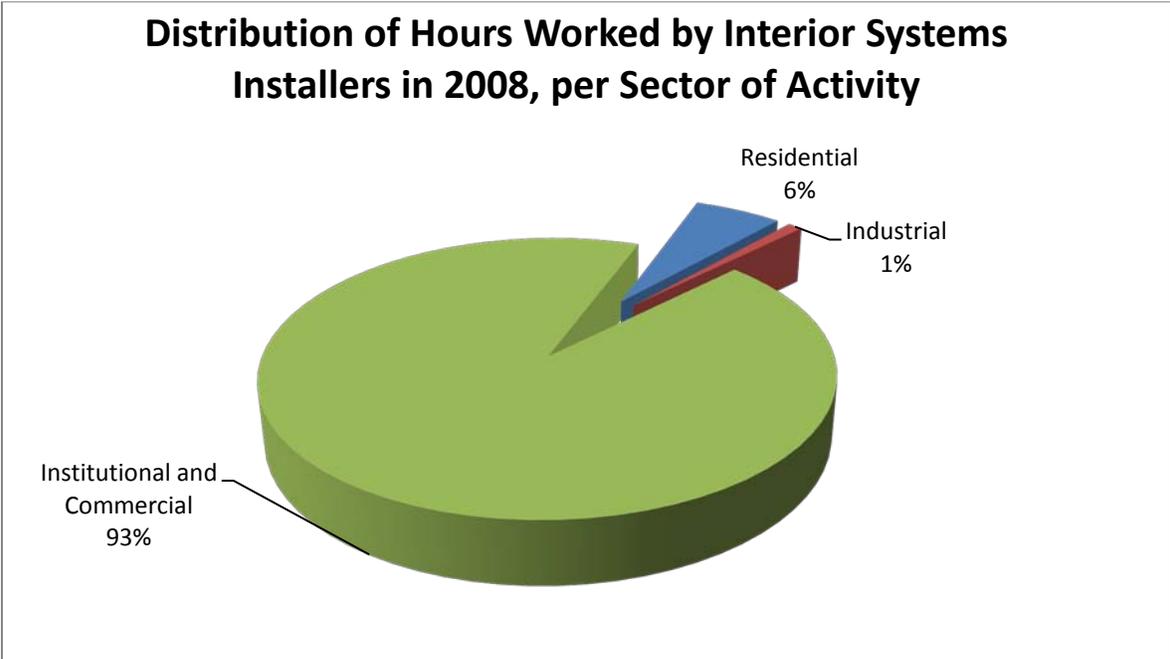
According to *Carrières construction*, interior systems installers are actually active in only three of the four construction industry sectors:

- industrial;
- institutional and commercial;
- residential.

The institutional and commercial sector accounts for 93% of the hours worked by interior systems installers⁴. Although the latter may work in the civil engineering sector, the total number of hours worked in this sector is minimal (0.3%).

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

Table 1.1 Workload Of Interior Systems Installers



The interior systems installers who attended the workshop consider that this table corresponds well to their perception of their work environments, although they add that the table may underestimate the hours worked in the residential sector, given the large volume of multi-storey condominium buildings being constructed.

Asked about the sector of activity in which they work, all the participants in the analysis workshop stated that they work mainly in the institutional and commercial sector.

In addition, it was established that seven of the participants also work in another sector. Thus, for five participants, the residential sector is their second sector of activity, whereas for others the industrial sector is.

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.

The workshop participants find this definition of the field of practice correct.

1.5 LEGISLATION AND REGULATIONS

Interior systems installers working in the construction industry 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 Safety Code for the construction industry (R.Q. c. S-2.1, r.6);
- the four sector-based collective agreements for the construction industry;
- the National Building Code (NBC);
- the Quebec Building Code, Chapter I, "Building";
- certain aspects of the Environment Quality Act (notably the Regulation respecting hazardous materials).

1.6 WORKING CONDITIONS ⁵

The following information provides an overview of the conditions and context of the work of interior systems installers, as commented by the participants. To obtain up-to-date and complete information that has legal effect, it is necessary to refer to the four collective agreements for the construction industry sectors.

Salary

At May 2009, this is how collective agreements established the hourly wage of a journeyman interior systems installer, depending on the sector of activity:

Industrial, institutional and commercial	\$32.15
Civil engineering and roadwork	\$32.14
Light residential	\$28.77
Heavy residential	\$32.13

Vacations and time off

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.

5. The working conditions data are taken from the 2007-2010 collective agreements for the four sectors of the construction industry and from the following document, published by the Commission de la construction du Québec: *Carrières construction, 2009-2010* ed.

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 as long as they remain active in the construction industry and work the required number of hours, whether or not they change employer.

Physical requirements

The interior systems installer trade is physically demanding. The person must:

- have good physical strength;
- have endurance;
- be in good physical condition;
- be able to work from heights.

Stress factors

The work of interior systems installers can be stressful. The most significant stress factors are the time allocated to do the work, high productivity requirements, cost control, and the apprehended consequences of a layout error.

Work schedules

A 40-hour work week from Monday to Friday is the general rule 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 work schedules 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.

The schedule of interior systems installers corresponds to that of construction sites, i.e., generally from 7 a.m. to 3 p.m., for a 40-hour work week.

Autonomy and work organization

Interior systems installers work alone and in teams under the supervision of a team leader or a foreman.

Erecting walls and partitions less than 10 ft. high, making layouts and correcting defects after delivery may be done individually.

Erecting walls and partitions more than 10 ft. high, installing suspended ceilings and dry panelling is usually done by a team.

1.7 JOB MARKET ENTRY CONDITIONS

To obtain the competency certificate-apprentice in the 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 *Health and Safety on Construction Sites* course;
- pay the required fees;
- designate the union association to which they wish to belong⁶.

In addition, candidates who have obtained a recognized diploma⁷ (DEP, AEC or DEC) must⁸:

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

Candidates who meet these requirements obtain a competency certificate-apprentice (CCA) in the trade of interior systems installer.

6. Source: http://www.ccq.org/E_CertificatsCompetence/E02_Apprenti.aspx?sc_lang=en&profil=GrandPublic.

7. The recognized program for obtaining a competency certificate-apprentice in the trade of interior systems installer is *Installing Interior Systems*.

8. Source: http://www.ccq.org/E_CertificatsCompetence/E02_Apprenti/E02_3_CandidatDiplome.aspx?sc_lang=en&profil=GrandPublic.

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. Thus, candidates without a diploma⁹ are eligible to obtain a competency certificate-apprentice (CCA) in a trade only during a labour shortage and must¹⁰:

- 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 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 interior systems installer must have completed three 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. Credits are paid into the apprenticeship record book of an apprentice interior systems installer who has obtained his diploma.

Moreover, certain characteristics are sought by employers hiring new interior systems installers. The following list presents the main characteristics, in the order in which they were mentioned, and not in order of importance:

- experience or the number of hours worked;
- the nature of the work to be done (for example, building a suspended ceiling or erecting a wall);
- the worker's geographic mobility.

9. Of the nine workshop participants, three have taken training in interior systems installation.

10. Source:

http://www.ccq.org/E_CertificatsCompetence/E02_Apprenti/E02_6_CandidatNonDiplome.aspx?sc_lang=en&profil=GrandPublic.

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, 33 women (journeymen and apprentices) practiced in 2008 the trade of interior systems installer, out of a total number of 2,626 (i.e., 1.26%).

According to the analysis workshop participants, the low proportion of women active in the trade can be explained by the profession's physical requirements. It was pointed out that several materials are very heavy and require substantial physical strength to be handled.

1.9 CAREER PROSPECTS

At the beginning of his career, a worker is often entrusted with handling materials or applying gypsum, dry panels or acoustical sealants, as well as preparing materials. Afterward, under a journeyman's supervision, he may erect partitions or walls and perform other more "technical" tasks.

According to participants, a journeyman's career prospects are: team leader, foreman, project manager, estimator, inspector and contractor.

1.10 DEVELOPMENT OF THE TRADE ¹²

In recent years, new materials have been used, such as asbestos cement, flexible sill plates or wall plates, header joists, high-density gypsum, earthquake-resistant suspensions, and ceiling products with improved acoustical properties.

Those new products have led to modifications to the work techniques of interior systems installers. So the latter have had to show greater versatility and good adaptability.

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

12. Read on this subject the professional subcommittee's comment in Annex 3.

In addition, the arrival of laser levels, pneumatic tools, stud guns and new scaffolding equipment (particularly aerial platforms) has contributed to modifying work methods and increasing productivity. The participants also cited the arrival of new support structures that may be made entirely with metal studs and require new techniques and welding.

1.11 IMPACT OF ENVIRONMENTAL STANDARDS ON THE PRACTICE OF THE TRADE

LEED (Leadership in Energy and Environmental Design) standards are being applied more and more in the industry and have spin-offs for interior system installations. The importance attached to waste management and recycling, as well as the priority given to work quality control and follow-up operations, are among changes observed in the work of interior systems installers.

2. WORK DESCRIPTION

2.1 TASKS AND OPERATIONS

List of tasks

The following list presents the main tasks performed by interior systems installers. The order in which the tasks are presented does not necessarily reflect their importance in the trade.

- Task 1 Erect a wall or partition;
- Task 2 Install suspended ceilings made of tiles or special products;
- Task 3 Install suspensions for gypsum ceilings (traditional method and inverted T-bar);
- Task 4 Rebuild lath ceilings;
- Task 5 Apply gypsum and any other type of dry panels.

During the workshop, a table of tasks and operations performed by interior systems installers was proposed to the participants. Following discussions, changes were made to the table. The final version is presented in the following pages.

Table 2.1 Tasks and Operations

Tasks	Operations					
1 ERECT A WALL OR PARTITION	1.1 Interpret plans and specifications	1.2 Plan the work	1.3 Trace and square the floors	1.4 Transfer the lines to the ceiling	1.5 Prepare the upper surface	1.6 Soundproof sill plates and wall plates, if applicable
	1.7 Install sill plates and wall plates	1.8 Install steel studs	1.9 Install stiffeners, if applicable	1.10 Install a nailing or screwing base, if applicable	1.11 Install framing (in one or three pieces) ¹³	1.12 Install insulation, if applicable
	1.13 Install the vapour barrier and acoustic insulation, if applicable	1.14 Install the resilient (soundproof) bar or metal furring, if applicable				
2 INSTALL SUSPENDED CEILINGS MADE OF TILES OR SPECIAL PRODUCTS	2.1 Interpret plans and specifications	2.2 Plan the work	2.3 Establish the height	2.4 Apply perimeter moulding, if applicable	2.5 Divide the room's surface and square it	2.6 Locate and prepare the supports
	2.7 Install the anchors and bend the supports	2.8 Suspend and align the main tee (tiles only)	2.9 Install and align the cross tees (tiles only)	2.10 Check the level and make adjustments, if applicable	2.11 Lay tiles or special products	

13. Read on this subject the professional subcommittee members' comment in Annex 3.

Tasks	Operations					
3 INSTALL SUSPENSIONS FOR GYPSUM CEILINGS (traditional method and inverted T-bar)	3.1 Interpret plans and specifications	3.2 Plan the work	3.3 Establish the height	3.4 Install the perimeter's metal L section, if applicable	3.5 Square the suspension system, if applicable (inverted T-bar)	3.6 Locate and prepare the supports
	3.7 Install the anchors and bend the supports level	3.8a Suspend and fasten the C-shaped iron (traditional method)	3.8b Suspend and align the main inverted T (inverted T-bar)	3.9a Fasten metal furring to the C-shaped iron (traditional method)	3.9b Install and align cross tees (inverted T-bar)	3.10 Check the level and make adjustments, if applicable (inverted T-bar)
4. REBUILD LATH CEILINGS	4.1 Interpret plans and specifications	4.2 Plan the work	4.3 Establish the height	4.4 Prepare anchors and pins	4.5 Install anchors and pins on the ceiling	4.6 Bend the pins at the level line on the ceiling
	4.7 Install a 1½ in. iron and fasten its ends to the wall	4.8 Make openings on the ceiling and wall	4.9 Position the 3/4-inch C-shaped secondary iron on the ceiling	4.10 Fasten metal laths		
5. APPLY GYPSUM AND ANY OTHER TYPE OF DRY PANELS	5.1 Interpret plans and specifications	5.2 Plan the work	5.3 Check the studs	5.4 Take measurements	5.5 Prepare the sheet	5.6 Apply acoustic or fire retardant sealants, if applicable
	5.7 Make the first sheet level	5.8 Cut out the openings	5.9 Screw the panels	5.10 Seal the joints to the exterior walls ¹⁴		

14. Read on this subject the professional subcommittee members' comment in Annex 3.

2.2 OPERATIONS, SUB-OPERATIONS AND CLARIFICATIONS

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

Table 2.2 Operations, Sub-Operations and Clarifications

TASK 1 ERECT A WALL OR PARTITION		
<i>Walls and partitions are made of metal structures to be covered with gypsum panels or other types of dry panels. They may be exterior or interior, load-bearing or not. The following walls should be distinguished, among others: simple, party, flame retardant, soundproof, mechanical well, removable, double, suspended, very high, low (dwarf), sandwich, partition, column, display and self-supporting partition.</i>		
Operations	Sub-Operations	Clarifications
1.1 Interpret plans and specifications		
1.2 Plan the work	1.2.1 Identify the type of material to use 1.2.2 Calculate the quantities of materials	Planning is often done according to contractor requirements.
1.3 Trace and square the floors	1.3.1 Check established axes and reference axes 1.3.2 Check the elevation and determine door and window locations 1.3.3 Trace lines according to the axes 1.3.4 Trace door and window openings	This operation is essential for the rest of the work and is often assigned to personnel who are experienced or specialized in this field.
1.4 Transfer the lines to the ceiling		
1.5 Prepare the upper surface	1.5.1 Clean the surface 1.5.2 Correct irregularities	
1.6 Soundproof sill plates and wall plates, if applicable	1.6.1 Install a neoprene membrane (interior partition) 1.6.2 Apply an acoustic or fire retardant sealant at the perimeter (interior partition) 1.6.3 Install a sill plate joint (exterior partition)	
1.7 Install sill plates and wall plates	1.7.1 Cut sill plates and wall plates 1.7.2 Nail the sill plates and wall plates 1.7.3 Screw the sill plates and wall plates	The sill plates may be installed on wood, concrete or steel surfaces.

TASK 1 ERECT A WALL OR PARTITION		
Operations	Sub-Operations	Clarifications
1.8 Install steel studs	1.8.1 Build the openings 1.8.2 Cut the studs 1.8.3 Adjust the studs 1.8.4 Install the studs 1.8.5 Check the alignment of service holes on the studs	
1.9 Install stiffeners, if applicable	1.9.1 Insert the stiffeners 1.9.2 Fasten the stiffeners with squares, if applicable	
1.10 Install a nailing or screwing base, if applicable		The nailing base may be in wood or metal. ¹⁵
1.11 Install framing (in one or three pieces) ¹⁶		
1.12 Install insulation, if applicable		
1.13 Install the vapour barrier and acoustic insulation, if applicable		
1.14 Install the resilient (soundproof) bar or metal furring, if applicable		

TASK 2 INSTALL SUSPENDED CEILINGS MADE OF TILES OR SPECIAL PRODUCTS

Suspended ceilings are generally located indoors. They are made of various materials and have various sizes. They may be acoustic, linear, luminous, metallic, coffered, Compassso or Paraline type, etc.

Some of the operations and sub-operations described below do not always apply to ceilings made of special products. Such products often have installation peculiarities indicated in manufacturers' installation manuals.

Operations	Sub-Operations	Clarifications
2.1 Interpret plans and specifications		
2.2 Plan the work	2.2.1 Check the type of material 2.2.2 Quantify the materials 2.2.3 Choose the type of scaffold 2.2.4 Request assistance if necessary 2.2.5 Choose the tools 2.2.6 Plan for safety equipment	

15. Read on this subject the professional subcommittee members' comment in Annex 3.
16. Read on this subject the professional subcommittee members' comment in Annex 3.

TASK 2 INSTALL SUSPENDED CEILINGS MADE OF TILES OR SPECIAL PRODUCTS

Operations	Sub-Operations	Clarifications
2.3 Establish the height	2.3.1 Use a laser to check the floor's highest level 2.3.2 Validate the height in relation to the plan 2.3.3 Check whether there are constraints	
2.4 Apply perimeter moulding, if applicable	2.4.1 Install a laser 2.4.2 Screw a moulding 2.4.3 Nail a moulding 2.4.4 Glue a moulding	
2.5 Divide the room's surface and square it	2.5.1 Check the calculations 2.5.2 Balance the dimensions according to the tiles to be cut 2.5.3 Take lighting locations into account 2.5.4 Conciliate the plan's requirements with the building's dimensions 2.5.5 Check the squaring	The building's dimensions occasionally differ from plan indications. Interior systems installers must then adapt the surface division accordingly.
2.6 Locate and prepare the supports	2.6.1 Install a suspension support (lifting beam), if applicable	
2.7 Install the anchors and bend the supports	2.7.1 Pierce metal or concrete 2.7.2 Fasten, screw or pin anchors and supports 2.7.3 Tighten the pins 2.7.4 Bend the pins level	
2.8 Suspend and align the main tee (tiles only)	2.8.1 Install dry lines 2.8.2 Cut tees 2.8.3 Fasten the tees according to the dry lines	
2.9 Install and align the cross tees (tiles only)	2.9.1 Immobilize the ceiling framing: <ul style="list-style-type: none"> - with a square - with a pin - with an earthquake-resistant support - by bending and fastening tee ends 	The immobilization aims to strengthen the system to avoid squaring loss. The latter could follow work done by workers in other trades (most often building services work).
2.10 Check the level and make adjustments, if applicable	2.10.1 Adjust the pin, if necessary 2.10.2 Wind the pin around itself	
2.11 Lay tiles or special products	2.11.1 Cut the tiles 2.11.2 Lay the tiles in the desired direction, if applicable	

**TASK 3 INSTALL SUSPENSIONS FOR GYPSUM CEILINGS
(TRADITIONAL METHOD AND INVERTED T-BAR)**

Ceiling suspensions are generally located indoors and may have drop ceilings made of gypsum.

Operations	Sub-Operations	Clarifications
3.1 Interpret plans and specifications		
3.2 Plan the work	3.2.1 Check the type of material 3.2.2 Quantify the materials 3.2.3 Choose the type of scaffold 3.2.4 Request assistance if necessary 3.2.5 Choose the tools 3.2.6 Plan for safety equipment	
3.3 Establish the height	3.3.1 Use a laser to check the floor's highest level 3.3.2 Validate the height in relation to the plan 3.3.3 Check whether there are constraints	
3.4 Install the perimeter's metal L section, if applicable	3.4.1 Install a laser 3.4.2 Cut the section 3.4.3 Fasten the section	
3.5 Square the suspension system, if applicable (inverted T-bar)		This operation requires less precision than its task 2 equivalent.
3.6 Locate and prepare the supports	3.6.1 Install a suspension support (lifting beam), if applicable	
3.7 Install the anchors and bend the supports level	3.7.1 Pierce metal or concrete 3.7.2 Fasten, screw or pin anchors and supports 3.7.3 Tighten the pins 3.7.4 Bend the pins level	
3.8a Suspend and fasten the C-shaped iron (traditional method)	3.8a.1 Cut the C-shaped iron 3.8a.2 Install the C-shaped iron 3.8a.3 Do the overlaps, if necessary	
3.8b Suspend and align the main inverted T (inverted T-bar)		
3.9a Fasten metal furring to the C-shaped iron (traditional method)		
3.9b Install and align cross tees (inverted T-bar)	3.9b.1 Cut the cross tees 3.9b.2 Install the cross tees	
3.10 Check the level and make adjustments, if applicable (inverted T-bar)		

TASK 4 REBUILD LATH CEILINGS

Formerly, applying laths was frequent, but laths are no longer installed in new constructions. However, existing constructions occasionally include drop ceilings and ceilings built in this old way. The interior systems installer then has to rebuild in laths certain parts of the drop ceilings or ceilings, in accordance with the building's style.

Operations	Sub-Operations	Clarifications
4.1 Interpret plans and specifications		
4.2 Plan the work	4.2.1 Order the equipment 4.2.2 Determine the location of openings (trapdoors, lighting, ventilation, etc.) 4.2.3 Choose the type of scaffold	
4.3 Establish the height		
4.4 Prepare anchors and pins		
4.5 Install anchors and pins on the ceiling		
4.6 Bend the pins at the level line on the ceiling	4.6.1 Install the laser 4.6.2 Bend the pins	
4.7 Install a 1½ in. iron and fasten its ends to the wall		
4.8 Make openings on the ceiling and wall		
4.9 Position the 3/4-inch C-shaped secondary iron on the ceiling		
4.10 Fasten metal laths	4.10.1 Attach the metal lath to the 3/4-inch iron	

TASK 5 APPLY GYPSUM AND ANY OTHER TYPE OF DRY PANELS

The purpose of this task is to apply gypsum or dry panels of various sizes and thicknesses on walls, partitions or ceilings. There may also be more than one layer of gypsum or dry panels.

Operations	Sub-Operations	Clarifications
5.1 Interpret plans and specifications		
5.2 Plan the work	5.2.1 Check the wall or ceiling composition 5.2.2 Check the type of material 5.2.3 Quantify the materials 5.2.4 Choose the type of scaffold	
5.3 Check the studs	5.3.1 Check the spacing between studs 5.3.2 Check the direction of studs	
5.4 Take measurements		
5.5 Prepare the sheet	5.5.1 Mark the openings 5.5.2 Cut the sheet 5.5.3 According to the shape of walls, partitions and ceilings: - wet the sheet - apply joint cement for bonding	
5.6 Apply acoustic or fire retardant sealants, if applicable		
5.7 Make the first sheet level		
5.8 Cut out the openings	5.8.1 Trim: - service boxes - door frames - trapdoors - ducts - etc.	This operation may also be performed while the sheet is being prepared. Here, the openings are cut out with a router, and its position corresponds better to the new working method.
5.9 Screw the panels	5.9.1 Screw every 8 to 12 in. (ceiling, for example) 5.9.2 Screw every 12 to 16 in. (wall, for example)	There are several screwing standards. The participants mentioned two as examples.
5.10 Seal the joints to the exterior walls ¹⁷		

17. Read on this subject the professional subcommittee members' comment in Annex 3.

2.3 ACHIEVEMENT CONDITIONS AND PERFORMANCE CRITERIA

2.3.1 Achievement Conditions

Data on achievement conditions were collected for the interior systems installer as a whole. The data pertain to aspects such as work areas, level of collaboration, work instructions, reference documents consulted, material resources used, and health and safety hazards.

The list of tools and equipment used for each task is presented in Annex 1.

Table 2.3 Achievement Conditions

TASK 1	ERECT A WALL OR PARTITION
Work areas	On the construction site, indoors or outdoors.
Level of collaboration	In a team. Under the supervision of the team leader or the foreman. Coordination is necessary with the electricity, mechanics and plumbing sectors regarding the location of service boxes, piping, etc.
Instructions and references	Based on the contractor's plans, specifications and instructions. With the aid of manufacturers' instruction manuals.
Raw materials (examples)	Floor sill plates 1 5/8, 2½, 3 5/8, 4 and 6 in. wide; flexible wall plates (8 in.); J-shaped wall plates; studs 1 5/8, 2½, 3 5/8, 4, 6 and 8 in. wide and C- or H-shaped studs; anchors and attachments; acoustic insulation; neoprene tape; acoustic wool A or insulating wool B 1½, 2½, 3½, 4, 6 and 8 in. thick; sill plate gasket (Etafoam); 1½ in. C-channel; machine screws; vapour barrier; resilient bar; metal furring; joint cover; baseboards and ceiling mouldings; acoustic and flame retardant sealants.
Health and safety hazards	In a context posing hazards: <ul style="list-style-type: none"> • of falls; • of cuts; • of backache; • of tendinitis; • related to noise.

TASK 2 INSTALL SUSPENDED CEILINGS MADE OF TILES OR SPECIAL PRODUCTS**Work areas**

On the construction site, indoors most of the time.

Level of collaboration

In a team.

Under the supervision of the team leader or the foreman.

Coordination is necessary with the electricity, mechanics and plumbing sectors.

Instructions and references

Based on the contractor's plans, specifications and instructions, and on on-site instructions.

With the aid of manufacturers' instruction manuals (ceilings made of special materials only).

Raw materials (examples)

Anchors; pins; mouldings; main tee; cross tee; tiles of various types; ½ in. U-channel; 1½ in. iron; cover straps; hold down pins for mouldings; channels; Paralock support; strand; joint cover; wool; strapping; 12 ft. strip; screws; nails and expansion joint.

Health and safety hazards

In a context posing hazards:

- of falling objects;
- of personal falls;
- of electric discharges;
- of backache;
- of eye and hand injuries caused by hanger wires;
- related to noise;
- of inhaling dangerous products;
- of chips in the eyes when using the powder-actuated tool.

**TASK 3 INSTALL SUSPENSIONS FOR GYPSUM CEILINGS
(TRADITIONAL METHOD AND INVERTED T-BAR)**

Work areas

On the construction site, indoors most of the time.

Level of collaboration

In a team.

Under the supervision of the team leader or the foreman.

Coordination is necessary with the electricity, mechanics and plumbing sectors.

Instructions and references

Based on the contractor's plans, specifications and instructions, and on on-site instructions.

With the aid of manufacturers' instruction manuals and data sheets.

Raw materials (examples)

Anchors; No. 9, No. 12 or 3/16-in. pins; 18-in. fasteners; 1½ in. channel (carrier); 1½ in. 1½ in. C-shaped iron support; 2¾ in. x 7/8 in. x 1/2 in. metal furring; wool; rigid and flexible mouldings; expansion joints; screws, self-drilling screws, and special screws; 1/2 in. x 1½ in. x 10 in. metal furring; 3/16 in. aluminum perimeter mouldings; perimeter mouldings for inverted T-bar; main tee; 4 ft. metal furrings.

Health and safety hazards

In a context posing hazards:

- of falling objects;
- of personal falls;
- of electric discharges;
- of backache;
- of eye and hand injuries caused by hanger wires;
- related to noise;
- of inhaling dangerous products;
- of chips in the eyes when using the powder-actuated tool.

TASK 4 REBUILD LATH CEILINGS

Work areas

On the construction site, indoors most of the time.

Level of collaboration

Alone or in a team, depending on the scale of the work.

Under the supervision of the team leader or the foreman.

Coordination is necessary with the electricity, mechanics and plumbing sectors.

Instructions and references

Based on specifications.

Raw materials (examples)

Metal laths; 3/4 in. iron; fasteners; anchors; 1½ in. channel; lath nails; expansion joints and pins (No. 18 and No. 9).

Health and safety hazards

In a context posing hazards:

- of cuts;
- of pin pricks and eye injuries caused by pins;
- of dust and cement chips;
- of falls;
- of electric discharges;
- of backaches;
- related to noise;
- of inhaling dangerous products.

TASK 5 APPLY GYPSUM AND ANY OTHER TYPE OF DRY PANELS**Work areas**

On the construction site, indoors or outdoors.

Level of collaboration

Alone or in a team (depending on height, weight and the condition of the premises).

Under the supervision of the team leader or the foreman.

Coordination is necessary with the electricity, mechanics and plumbing sectors.

Instructions and references

Based on the contractor's plans, specifications and instructions.

Raw materials (examples)

1/4 in. gypsum and dry panels, 3/8, 1/2, 5/8, 3/4 or 1 in. flexible panels (fire retardant, water repellent, etc.), Core-Board panels (mechanical well); Fiberbound or Fiberock ultra-strength panels; Gyplap panels for outdoor installation, light concrete panels and drywall screws.

Health and safety hazards

In a context posing hazards:

- of cuts;
- of falls;
- of electric discharges;
- of backache;
- of dust in the eyes;
- of pin pricks.

2.3.2 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 three. Their results were then collected and presented in full session. So some criteria may apply at times to other tasks as well as to those for which they were selected.

Table 2.4 Performance Criteria

TASK 1 ERECT A WALL OR PARTITION	
Performance Criteria	
Wearing safety clothing	Well located and level door frames
Appropriate use of safety equipment	Appropriate insulation and caulking
Sense of responsibility and organization	Cleanliness
Initiative and resourcefulness	Meeting deadlines
Method	Observance of plans and specifications
Locating the wall or partition well	Meeting environmental standards
Square and level partition or wall	Meeting occupational health and safety rules
TASK 2 INSTALL SUSPENDED CEILINGS MADE OF TILES OR SPECIAL PRODUCTS	
Performance Criteria	
Wearing safety clothing	Tiles well cut and laid in the correct direction
Appropriate use of safety equipment	Precise work: 1/8 in. of levelling every 12 ft.
Caution	Aesthetic work
Protection of adjacent structures	Cleanliness of the work area and finishing materials
Squared ceilings	Meeting deadlines
Straight ceilings	Observance of plans and specifications
Level and aligned ceilings	Meeting manufacturers' standards
Solid ceilings	Meeting environmental standards
Openings of correct sizes	Meeting occupational health and safety rules
Applying materials at the required temperature	

TASK 3 INSTALL SUSPENSIONS FOR GYPSUM CEILINGS (TRADITIONAL METHOD AND INVERTED T-BAR)	
Performance Criteria	
Wearing safety clothing	Precise work: 1/8 in. of levelling every 12 ft.
Appropriate use of safety equipment	Aesthetic work
Caution	Cleanliness of the work area
Squared ceilings	Meeting deadlines
Straight ceilings	Observance of plans and specifications
Level and aligned ceilings	Meeting environmental standards
Solid ceilings	Meeting occupational health and safety rules
Openings of correct sizes	
TASK 4 REBUILD LATH CEILINGS	
Performance Criteria	
Wearing safety clothing	Solid mesh
Appropriate use of safety equipment	Lath restoration compliant with the original design
Sense of responsibility and organization	Meeting deadlines
Method	Observance of plans and specifications
Prudence	Meeting environmental standards
Precision	Meeting occupational health and safety rules
TASK 5 APPLY GYPSUM AND ANY OTHER TYPE OF DRY PANELS	
Performance Criteria	
Wearing safety clothing	Correct panel alignment
Appropriate use of safety equipment	Level panels
Caution	Openings well cut and adjusted
Precision	Cleanliness of materials
Panel application starting-point according to the direction of studs	Meeting deadlines
panel angles correctly cut	Observance of plans and specifications
Panels inserted correctly	Meeting environmental standards
Panels tightly screwed	Meeting occupational health and safety rules

2.4 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 interior systems installer, a function related to suspension installation stands out and groups the following tasks:

- Task 2: Install suspended ceilings made of tiles or special products
- Task 3: Install suspensions for gypsum ceilings (traditional method and inverted T-bar)
- Task 4: Rebuild lath ceilings

3. QUANTITATIVE DATA ON TASKS

3.1 OCCURRENCE

Occurrence data concern the percentage of interior systems installers who perform a task in the same workplace. The data presented in the tables below are the average results for the interior systems installers who participated in the workshop. However, they provide information on the use of time not only by the interior systems installers who attended the workshop, but also by all interior systems installers working in the companies represented.

Table 3.1 Occurrence of Tasks

Task	Occurrence
1. Erect a wall or partition	90.7%
2. Install suspended ceilings made of tiles or special products	80.9%
3. Install suspensions for gypsum ceilings (traditional method and inverted T-bar)	85.3%
4. Rebuild lath ceilings	21.4%
5. Apply gypsum and any other type of dry panels	89.4%

3.2 WORK TIME

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

Table 3.2 Work Time Allocated to Tasks

Task	Work Time
1. Erect a wall or partition	36.8%
2. Install suspended ceilings made of tiles or special products	21.7%
3. Install suspensions for gypsum ceilings (traditional method and inverted T-bar)	14.9%
4. Rebuild lath ceilings	1.1%
5. Apply gypsum and any other type of dry panels	25.5%

As revealed by these data, the task of rebuilding lath walls and ceilings, although it is performed by over 21% of interior systems installers, represents little work time.

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. Not important at all: 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 participants.

Table 3.3 Importance and Difficulty of Tasks

Task	Importance	Difficulty
1. Erect a wall or partition	4.0	2.3
2. Install suspended ceilings made of tiles or special products	3.9	2.2
3. Install suspensions for gypsum ceilings (traditional method and inverted T-bar)	3.7	2.2
4. Rebuild lath ceilings	1.7	2.9
5. Apply gypsum and any other type of dry panels	3.1	3.2

4. KNOWLEDGE, SKILLS AND ATTITUDES

The occupational 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

Drawing diagrams and interpreting plans

The interior systems installer must draw diagrams on certain occasions, to picture the work to be done (for drop ceilings, for example). He must also be able to interpret plans that include projections, cross-sections, views (elevation and plan) and symbols.

The plans consulted may be a building's architectural, structural or mechanical plans.

Knowledge of diagram drawing and plan interpretation is particularly useful to:

- Interpret plans and specifications (operations 1.1, 2.1, 3.1, 4.1 and 5.1);
- Trace and square the floors (operation 1.3);
- Establish the height (operations 2.3, 3.3 and 4.3);
- Divide the room's surface and square it (operation 2.5);
- Suspend and fasten the C-shaped iron (traditional method) or suspend and align the main inverted T (inverted T-bar) (operations 3.8a and 3.8b).

Mathematics

To exercise their profession, interior systems installers must be able to convert measurements between the imperial and metric systems, perform the four basic mathematical operations, apply the rule of three and calculate fractions.

The ability to perform mental arithmetic is often very useful, when the person does not have a calculator available to him.

Interior systems installers must also have a knowledge of geometry, particularly in applying the Pythagorean theorem and calculating volumes, radiuses, degrees and surfaces.

Mathematical knowledge is particularly useful to:

- Interpret plans and specifications (operations 1.1, 2.1, 3.1, 4.1 and 5.1);
- Plan the work (operations 1.2, 2.2, 3.2, 4.2 and 5.2);
- Trace and square the floors (operation 1.3);
- Divide the room's surface and square it (operation 2.5);
- Lay tiles or special products (operation 2.11);
- Square the suspension system, if applicable (inverted T-bar) (operation 3.5);
- Make openings on the ceiling and wall (operation 4.8);
- Take measurements (operation 5.4);
- Prepare the sheet (operation 5.5);
- Cut out the openings (operation 5.8).

Manual machining

On certain occasions, interior systems installers must do drilling work, but it is quite rare that they have to perform other manual machining operations such as tapping or threading.

Laws and regulations

Referring to the list of laws and regulations presented in Section 1.5, the interior systems installers who attended the workshop specified that this knowledge is required for all the tasks, particularly for work planning operations.

4.2 SKILLS

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

4.2.1 Cognitive Skills

Problem-solving

This skill is useful for operations related to layout and squaring (operations 1.3, 2.5 and 3.5), for establishing the height (operations 2.3, 3.3 and 4.3), for moving divisions depending on the obstacles encountered (task 1) and for preparing supports (or the lifting beam).

Planning activities

This skill is obviously useful for all work planning activities (1.2, 2.2, 3.2, 4.2 and 5.2), but also for organizing work when there is duplication with other trades, and for the task of applying gypsum and dry panels when the installers close walls and ceilings definitively.

Decision-making

According to the workers attending the analysis workshop, foremen rather than journeymen are responsible for decision-making.

4.2.2 Motor Skills

Motor skills involve gestures and movements. The main motor skills necessary to the trade of interior systems installers are the following:

- dexterity, for screwing gypsum and dry panels, fastening furring or attachments, and cutting gypsum and dry panels;

- coordination of hand, foot and at times head movements, for applying gypsum and dry panels;
- physical strength, i.e., the capacity to lift, carry, push and pull loads exceeding 50 kg.

4.2.3 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 interior systems installers are the following:

- sight, to perceive the laser beam and distinguish squaring defects and details;
- hearing, to detect falling objects and thus protect oneself against occupational health and safety hazards;
- smell, to perceive chemical and gas odours, and thus protect oneself against occupational health and safety hazards;
- touch, to recognize panel thicknesses.

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 interior systems installers are listed below.

Personal and interpersonal attitudes

These attitudes are manifested by passion for the trade, the ability to work in a team, the establishment of harmonious communication with colleagues, and patience toward apprentices.

Professional ethics

Respect for others, punctuality, diligence and honesty are signs of professional ethics displayed by interior systems installers.

Preventive attitudes and behaviours related to health and safety

These attitudes and behaviours are manifested by:

- the ability to be an example;
- wearing personal safety equipment (hard hat, harness, safety glasses, ear plugs, safety footwear, etc.);
- following the recommendations of health and safety committees present on the construction site;
- interest in taking training courses in occupational health and safety;
- locating and using assembly points in case of danger;
- the ability to use fire extinguishers when the person is working with tools that produce sparks.

5. TRAINING SUGGESTIONS

The participants in the occupational analysis workshops made suggestions about the initial training and the training of apprentices.

Regarding the initial training, some participants would like training centres to use selection criteria that verify the interest of candidates.

Several participants also consider that the training should integrate the practical aspect more extensively. These person suggest:

- to introduce a stage in the training;
- to implement the alternating work-study formula;
- to make more demonstrations in courses;
- to simulate situations on the construction site;
- to update the teaching of working methods.¹⁸

One specialist requested that the future study program include a module on mechanical wells.

As for the training of apprentices, it was suggested to improve their supervision, notably by establishing a tutorial system.

18. Read the professional subcommittee members' comment in Annex 3 regarding the DEP.

Annexes

Annex 1 TOOLS AND EQUIPMENT

For each task of interior systems installers and based on a list¹⁹ submitted to them, identified the tools and equipment they use: hand tools, power tools and equipment, layout and measuring devices, material handling and site maintenance equipment, scaffolding and site access equipment, personal protective equipment and safety equipment.

Table A.1 Tools and Equipment

TASK 1 ERECT A WALL OR PARTITION

Hand Tools

Aviation snips	Utility knife
Cold chisel	Locking C-clamp
Wrecking bar	Square (T, combination, tri (speed square))
Hammer	Lather's hatchet
Caulking gun	Stud crimpers
Pliers	

Power Tools and Equipment

Power nailer/fastener	Cordless drill
Drywall screwdriver	Powder-actuated tool
Electric shears	Hacksaw
Nibbler	Metal slitting saw
Impact drill	

Layout and Measuring Devices

Calculator	T-bevel
Chalk line	Plumb bob
Framing square	Spirit level
Dry line	Laser level
Laser measure tool	Measuring tape
Pencil and marker	

19. This list was based on the findings of the lather (interior systems mechanic) occupational analysis performed for Red Seal: Human Resources and Skills Development Canada, *Occupational Analyses Series: Lather*, Ottawa, 2007, p. 45 to 47.

Material Handling and Site Maintenance Equipment

Drywall cart	Sawhorse or portable bench
Extension cord	

Scaffolding and Access Equipment

Swing stage	Scissor-lift
Portable scaffold	Stationary scaffold
Ladder	Rolling scaffold
Stepladder	Extendable boom lift

Personal Protective Equipment and Safety Equipment

Steel toe boots	Ear plugs and muffs
Hard hat	Fall arrest and restraint equipment
Gloves	Knee pads
Safety glasses	Mask (particle, vapour)

TASK 2 INSTALL SUSPENDED CEILING TILES OR SPECIAL PRODUCTS

Hand Tools

Dry line/T-bar clips (tweezers)	Locking C-clamp
Aviation snips	Drywall saw
Nippers	Framing square
Circular punch	Utility knife
Hammer	Multi-tip screwdriver
Combination pliers	Hole punch
Sheet-metal apron punch	Lather's hatchet
Hacksaw	Bullnose

Power Tools and Equipment

Electric shears	Drywall router
Impact drill	Cordless drill
Electric drill	Powder-actuated tool
Jigsaw	Compound mitre saw
Bench saw	Circular saw
Drywall screwdriver	

Layout and Measuring Devices

Calculator	Pencil and marker
Chalk line	T-bevel
Dry line	Plumb bob
Centre punch	Spirit level
Laser level	Measuring tape
Compass	

Material Handling and Site Maintenance Equipment

Drywall cart	Sawhorse or portable bench
Extension cord	

Scaffolding and Access Equipment

Portable scaffold	Stationary scaffold
Ladder	Rolling scaffold
Stepladder	Extendable boom lift
Scissor-lift	

Personal Protective Equipment and Safety Equipment

Steel toe boots	Ear plugs and muffs
Hard hat	Fall arrest and restraint equipment
Gloves	Mask (particle, vapour)
Safety glasses	

TASK 3 INSTALL SUSPENSIONS FOR GYPSUM CEILINGS (TRADITIONAL METHOD AND INVERTED T-BAR)

Hand Tools

Aviation snips	Dry line/T-bar clips (tweezers)
Hammer	Utility knife
Electrician's pliers	Lather's hatchet
Plier spot welding head	Locking C-clamp
Sheet-metal apron punch	Multi-tip screwdriver
Hacksaw	

Power Tools and Equipment

Jigsaw	Powder-actuated tool
Electric drill	Drywall screwdriver
Impact drill	Drywall router
Cordless drill	

Layout and Measuring Devices

Chalk line	Compass
Framing square	Pencil and marker
T-bevel	Spirit level
Dry line	Laser level
Measuring tape	

Material Handling and Site Maintenance Equipment

Drywall cart	Sawhorse or portable bench
Extension cord	

Scaffolding and Access Equipment

Portable scaffold	Stationary scaffold
Ladder	Rolling scaffold
Stepladder	Extendable boom lift
Scissor-lift	

Personal Protective Equipment and Safety Equipment

Steel toe boots	Ear plugs and muffs
Hard hat	Fall arrest and restraint equipment
Gloves	Mask (particle, vapour)
Safety glasses	

TASK 4 REBUILD LATH CEILINGS

Hand Tools

Aviation snips	Framing square
Hammer	Hacksaw
Combination pliers	Locking C-clamp
Stud crimpers	

Power Tools and Equipment

Power nailer/fastener	Drywall screwdriver
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Layout and Measuring Devices

Calculator	Laser level
Measuring tape	

Material Handling and Site Maintenance Equipment

Extension cord	
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Scaffolding and Access Equipment

Swing stage	Scissor-lift
Portable scaffold	Stationary scaffold
Ladder	Rolling scaffold
Stepladder	Extendable boom lift

Personal Protective Equipment and Safety Equipment

Steel toe boots	Ear plugs and muffs
Hard hat	Fall arrest and restraint equipment
Gloves	Mask (particle, vapour)
Safety glasses	

TASK 5 APPLY GYPSUM AND ANY OTHER TYPE OF DRY PANELS

Hand Tools

Utility knife	Multi-tip screwdriver
Hole punch	Circular punch
Screw puller	Lather's hatchet
Drywall lift	Hammer
Caulking gun	Drywall rasp
Drywall saw	Drywall square

Power Tools and Equipment

Drywall router	Drywall screwdriver
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Layout and Measuring Devices

Chalk line	Compass
Pencil and marker	T-bevel
Level	Spirit level
Measuring tape	

Material Handling and Site Maintenance Equipment

Drywall cart	Extension cord
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Scaffolding and Access Equipment

Drywall lifter	Scissor-lift
Swing stage	Stationary scaffold
Portable scaffold	Rolling scaffold
Ladder	Extendable boom lift

Personal Protective Equipment and Safety Equipment

Steel toe boots	Ear plugs and muffs
Hard hat	Fall arrest and restraint equipment
Knee pads	Safety glasses
Mask (particle, vapour)	

Annex 2
OCCUPATIONAL HEALTH AND SAFETY GRILS

Produced by: **Bernard Teasdale**, inspector
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Table A.2 Description of Hazards

No.	Hazards	Effects on Health and Safety	Means of Prevention
1	<p>Same-level fall hazards</p> <ul style="list-style-type: none"> - Housekeeping - Slippery surfaces (rain, oil, snow, etc.) 	<ul style="list-style-type: none"> - Collisions, contusions, fractures, bruises 	<ul style="list-style-type: none"> - Clean the workplace (pick up debris). - Apply abrasives to make the surface less slippery. - Reserve equipment storage areas.
2	<p>Fall-from-height hazards</p> <p>2 a) Using a ladder</p> <p>2 b) Using a stepladder</p> <p>2 c) Using a self-propelled manlift platform</p>	<ul style="list-style-type: none"> - Collisions, internal injuries, fractures, bruises, psychological and physical after-effects, death 	<p>2 a) Climb up and down facing the equipment.</p> <ul style="list-style-type: none"> - Use a class 1 ladder with a nominal capacity of 250 lb. - Maintain three support points. - Observe the angle of slope. - Climb up and down while holding the bars and not the side rails. - Remain between the side rails. <p>2 b) Use a class 1 stepladder with a nominal capacity of 250 lb.</p> <ul style="list-style-type: none"> - Ensure that the spreader bars are completely open. - install on a firm level surface. - choose a stepladder according to the required height. <p>2 c) Wear a safety harness with shock absorber in the jib-boom platform:</p> <ul style="list-style-type: none"> - Delimit the work area on the ground to avoid collision hazards. - Keep the feet on the platform floor. - Climb up and down facing the equipment, while maintaining three support points. - Keep the platform's means of access and floor clean.

No.	Hazards	Effects on Health and Safety	Means of Prevention
	<p>2 d) Using small mobile scaffolding (Baker)</p> <p>2 e) Using metal frame scaffolding</p> <p>2 f) Using a swing stage</p>		<p>2 d) Always use the wheel locking mechanism.</p> <ul style="list-style-type: none"> - Climb down mobile scaffolding to move it. <p>2 e) When there is a risk of falling more than 3 metres:</p> <ul style="list-style-type: none"> - Install a railing or wear a shock-absorbing harness, with an anchor that has a breaking strength of 18 kN or a vertical lifeline complying with the specifications in the Safety Code for the construction industry. - 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. - Ensure that the structure's anchors are installed at intervals not exceeding 3 times the minimum scaffolding width. - Use planks carrying the NLGA seal of approval, and make sure that the floor is wide enough (min. 470 mm) and that the distance between the structure and the floor is less than 350 mm. <p>2 f)</p> <ul style="list-style-type: none"> - Observe the usage prohibition for persons less than 18 years of age. - Ensure that each worker is wearing a safety harness with a rope grab on a vertical lifeline. - Use a winch equipped with two independent braking mechanisms, including an automatic brake. - Ensure that the installation complies with the engineer's plan or the manufacturer's instructions.

No.	Hazards	Effects on Health and Safety	Means of Prevention
3	Falling object hazards	<ul style="list-style-type: none"> - Collisions, internal injuries, fractures, bruises, psychological and physical after-effects, death 	<ul style="list-style-type: none"> - Never do superimposed jobs. - Wear a hard hat at all times. - Delimit the work area on the ground. - Raise and lower tools and light equipment with a rope in platforms and scaffolds.
4	Chemical hazards <ul style="list-style-type: none"> - Silica dust (gypsum panel, plaster, cement, etc.) - Asbestos (old buildings, parging, plaster, etc.) 	<ul style="list-style-type: none"> - Respiratory illnesses, cancer, silicosis, asbestosis 	<ul style="list-style-type: none"> - Took WHMIS training. - Carry respiratory protection and filters appropriate to contaminants and to the risk level (P100). - Ensure appropriate mechanical or natural ventilation for the risk level. - Wear personal protective equipment (gloves, disposable coveralls). - Wear safety glasses or a visor. - Use a vacuum cleaner equipped with a highly effective filter or knock the dust down with a damp process.
5	Ergonomic hazards <ul style="list-style-type: none"> - Posture constraints / static - Repeated movements - Handling - Difficulty of the task - Excessive efforts 	<ul style="list-style-type: none"> - Musculoskeletal lesions, sprains, tendinitis, hernias, fatigue, discomfort, pain 	<ul style="list-style-type: none"> - Rotate tasks if possible. - Favour the purchase of tools limiting vibrations to a minimum. - Use handling equipment (cart for gypsum panels). - Use handling techniques.
6	Electrical hazards <ul style="list-style-type: none"> - Contact with an overhead electric lines - Electric tools 	<ul style="list-style-type: none"> - Burns, electrification, electrocution 	<ul style="list-style-type: none"> - Maintain the minimum distances of approach prescribed by the Safety Code. - Reach a work agreement with the operating company and the CSST. - Ensure that tools have double insulation. - Use appropriate extension cords in good condition.
7	Noise hazards	<ul style="list-style-type: none"> - Hearing loss, occupational deafness 	<ul style="list-style-type: none"> - Wear hearing protection. - Choose the appropriate tool and work method.

No.	Hazards	Effects on Health and Safety	Means of Prevention
8	General hazards	- Cuts, lacerations, scratches, objects thrown in the eyes, cold, heat, etc.	- Wear appropriate personal protection equipment (gloves, glasses, visor, disposable coveralls, etc.).

Table A.3 Risk Sources Related to Interior Systems Installer’ Tasks and Operations

Legend

0	The risk is nil.
x	The risk is low.
xx	The risk is average.
xxx	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.

Task 1 ERECT A WALL OR PARTITION

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
1.1	Interpret plans and specifications	0	0	0	0	0	0	+
1.2	Plan the work	0	0	0	0	0	0	+
1.2.1	Identify the type of material to use	0	0	0	0	0	0	+
1.2.2	Calculate the quantities of materials	0	0	0	0	0	0	+
1.3	Trace and square the floors	0	0	0	0	+	0	+
1.3.1	Check established axes and reference axes	0	0	0	0	+	0	+
1.3.2	Check the elevation and determine door and window locations	0	0	0	0	+	0	+
1.3.3	Trace lines according to the axes	0	0	0	0	+	0	+
1.3.4	Trace door and window openings	0	++	+	0	+	0	+
1.4	Transfer the lines to the ceiling	++	+++	++	0	+	0	+
1.5	Prepare the upper surface	++	+++	++	+	+	0	+
1.5.1	Clean the surface	++	+++	++	+	+	0	+
1.5.2	Correct irregularities	++	+++	++	+	+	0	+
1.6	Soundproof sill plates and wall plates, if applicable	++	+++	++	+	++	0	+
1.6.1	Install a neoprene membrane (interior partition)	+++	+++	++	+	++	0	+

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
1.6.2	Apply an acoustic or flame retardant sealant at the perimeter (interior partition)	+++	+++	++	+	++	0	+
1.6.3	Install a sill plate (exterior partition)	+++	+++	++	+	++	0	+
1.7	Install sill plates and wall plates	+++	+++	+++	0	++	+	+++
1.7.1	Cut sill plates and wall plates	+++	+++	+++	0	++	+	+++
1.7.2	Nail the sill plates and wall plates	+++	+++	+++	0	++	+	+++
1.7.3	Screw the sill plates and wall plates	+++	+++	+++	0	++	+	+++
1.8	Install steel studs	+++	+++	+++	+	++	+	++
1.8.1	Build the openings	++	+++	+++	+	++	+	+
1.8.2	Cut the studs	++	+++	+++	+	++	+	+
1.8.3	Adjust the studs	+++	+++	+++	+	++	+	+
1.8.4	Install the studs	+++	+++	+++	+	++	++	++
1.8.5	Check the alignment of service holes on the studs	++	+++	++	0	+	+	+
1.9	Install stiffeners, if applicable	++	+++	++	0	+	+	++
1.9.1	Insert the stiffeners	++	+++	++	0	+	+	++
1.9.2	Fasten the stiffeners with squares, if applicable	++	+++	++	0	+	+	++
1.10	Install a nailing or screwing base, if applicable	+++	+++	+++	0	+	+	++
1.11	Install framing (in one or three pieces)	+++	+++	+++	0	+	+	+++
1.12	Install insulation, if applicable	+++	+++	++	+++	+	0	+
1.13	Install the vapour barrier and acoustic insulation, if applicable	+++	+++	++	+	++	0	+
1.14	Install the resilient (soundproof) bar or metal furring, if applicable	+++	+++	++	0	+	+	++

Task 2 INSTALL SUSPENDED CEILINGS MADE OF TILES OR SPECIAL PRODUCTS

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
2.1	Interpret plans and specifications	0	0	0	0	0	0	0
2.2	Plan the work	0	0	0	0	0	0	0
2.2.1	Check the type of material	0	0	0	0	0	0	0
2.2.2	Quantify the materials	0	0	0	0	0	0	0
2.2.3	Choose the type of scaffold	0	0	0	0	0	0	0
2.2.4	Request assistance if necessary	0	0	0	0	0	0	0
2.2.5	Choose the tools	0	0	0	0	0	0	0
2.2.6	Plan for safety equipment	0	0	0	0	0	0	0
2.3	Establish the height	++	++	++	0	+	0	+
2.3.1	Use a laser to check the floor's highest level	++	++	++	0	+	0	+
2.3.2	Validate the height in relation to the plan	++	++	++	0	+	0	+
2.3.3	Check whether there are constraints	++	++	++	0	+	0	+
2.4	Apply perimeter moulding, if applicable	+++	+++	+++	+	+	+	+++
2.4.1	Install a laser	+++	+++	+++	+	+	+	+++
2.4.2	Screw a moulding	+++	+++	+++	+	+	+	+++
2.4.3	Nail a moulding	+++	+++	+++	+	+	+	+++
2.4.4	Glue a moulding	+++	+++	+++	+	+	+	+++
2.5	Divide the room's surface and square it	+	+++	++	0	0	0	+
2.5.1	Check the calculations	0	0	0	0	0	0	0
2.5.2	Balance the dimensions according to the tiles to be cut	0	0	0	0	0	0	0
2.5.3	Take lighting locations into account	0	0	0	0	0	0	0
2.5.4	Conciliate the plan's requirements with the building's dimensions	0	0	0	0	0	0	0
2.5.5	Check the squaring	+	+++	++	0	0	0	+

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
2.6	Locate and prepare the supports	++	+++	+++	0	++	++	+
2.6.1	Install a suspension support (lifting beam), if applicable	++	+++	+++	0	++	++	+
2.7	Install the anchors and bend the supports	+++	+++	+++	+	++	++	+++
2.7.1	Pierce metal or concrete	+++	+++	+++	++	++	++	+++
2.7.2	Fasten, screw or pin anchors and supports	+++	+++	+++	+	+	++	+++
2.7.3	Tighten the pins	+++	+++	+++	0	++	++	+++
2.7.4	Bend the pins level	+++	+++	+++	0	+	++	+++
2.8	Suspend and align the main tee (tiles only)	+++	+++	+++	+	++	++	+
2.8.1	Install dry lines	+++	+++	+++	+	++	++	+
2.8.2	Cut tees	+++	+++	+++	0	++	++	+
2.8.3	Fasten the tees according to the dry lines	+++	+++	+++	0	++	++	+
2.9	Install and align the cross tees (tiles only)	+++	+++	++	0	++	++	+
2.9.1	Immobilize the ceiling framing: - with a square - with a pin - with an earthquake-resistant support - by bending and fastening tee ends	+++	+++	++	0	++	++	+
2.10	Check the level and make adjustments, if applicable	+++	+++	++	0	+++	++	+
2.10.1	Adjust the pin, if necessary	+++	+++	++	0	+++	+	+
2.10.2	Wind the pin around itself	+++	+++	++	0	+++	+	+
2.11	Lay tiles or special products	+++	+++	+++	+++	+++	+	+
2.11.1	Cut the tiles	+++	+++	++	+++	+++	++	+
2.11.2	Lay the tiles in the desired direction, if applicable	+++	+++	++	+++	++	+	+

Task 3 INSTALL SUSPENSIONS FOR GYPSUM CEILINGS (TRADITIONAL METHOD AND INVERTED T-BAR)

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
3.1	Interpret plans and specifications	0	0	0	0	0	0	0
3.2	Plan the work	0	0	0	0	0	0	0
3.2.1	Check the type of material	0	0	0	0	0	0	0
3.2.2	Quantify the materials	0	0	0	0	0	0	0
3.2.3	Choose the type of scaffold	0	0	0	0	0	0	0
3.2.4	Request assistance if necessary	0	0	0	0	0	0	0
3.2.5	Choose the tools	0	0	0	0	0	0	0
3.2.6	Plan for safety equipment	0	0	0	0	0	0	0
3.3	Establish the height	++	++	++	0	+	+	+
3.3.1	Use a laser to check the floor's highest level	++	++	++	0	+	+	+
3.3.2	Validate the height in relation to the plan	++	++	++	0	+	+	+
3.3.3	Check whether there are constraints	++	++	++	0	+	+	+
3.4	Install the perimeter's metal L section, if applicable	+++	+++	+++	+	++	++	+++
3.4.1	Install a laser	+++	+++	++	0	+	+	+
3.4.2	Cut the section	+++	+++	++	0	+	++	++
3.4.3	Fasten the section	+++	+++	+++	+	++	++	+
3.5	Square the suspension system, if applicable (inverted T-bar)	+++	+++	++	0	++	++	+++
3.6	Locate and prepare the supports	++	+++	++	0	++	++	+++
3.6.1	Install a suspension support (lifting beam), if applicable	+++	+++	++	+	++	++	+++

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
3.7	Install the anchors and bend the supports level	+++	+++	++	+	++	++	++
3.7.1	Pierce metal or concrete	+++	+++	++	++	++	++	++
3.7.2	Fasten, screw or pin anchors and supports	+++	+++	++	+	++	++	++
3.7.2	Tighten the pins	+++	+++	++	0	++	++	++
3.7.3	Bend the pins level	+++	+++	++	0	++	++	++
3.8a	Suspend and fasten the C-shaped iron (traditional method)	+++	+++	++	0	++	++	+
3.8a.1	Cut the C-shaped iron	+++	+++	++	0	++	++	++
3.8a.2	Install the C-shaped iron	+++	+++	++	0	++	++	+
3.8a.3	Do the overlaps, if necessary	+++	+++	++	0	++	++	+
3.8b	Suspend and align the main inverted T (inverted T-bar)	+++	+++	++	0	++	++	+
3.9a	Fasten metal furring to the C-shaped iron (traditional method)	+++	+++	++	0	++	++	+
3.9b	Install and align cross tees (inverted T-bar)	+++	+++	++	0	++	++	+
3.9b.1	Cut the cross tees	+++	+++	++	0	++	++	++
3.9b.2	Install the cross tees	+++	+++	++	0	++	++	++
3.10	Check the level and make adjustments, if applicable (inverted T-bar)	+++	+++	0	0	++	++	+

Task 4 REBUILD LATH CEILINGS

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
4.1	Interpret plans and specifications	0	0	0	0	0	0	0
4.2	Plan the work	0	0	0	0	0	0	0
4.2.1	Order the equipment	0	0	0	0	0	0	0
4.2.2	Determine the location of openings (trapdoors, lighting, ventilation, etc.)	0	0	0	0	0	0	0
4.2.3	Choose the type of scaffold	0	0	0	0	0	0	0
4.3	Establish the height	+++	+++	++	0	++	0	+
4.4	Prepare anchors and pins	+++	+++	++	0	++	++	++
4.5	Install anchors and pins on the ceiling	+++	+++	++	0	++	++	++
4.6	Bend the pins at the level line on the ceiling	+++	+++	++	0	++	++	++
4.6.1	Install the laser	+++	+++	++	0	++	++	++
4.6.2	Bend the pins	+++	+++	++	0	++	++	++
4.7	Install a 1½ in. iron and fasten its ends to the wall	+++	+++	++	0	++	++	+
4.8	Make openings on the ceiling and wall	+++	+++	++	+++	++	+	++
4.9	Position the 3/4-inch C-shaped secondary iron on the ceiling	+++	+++	++	0	++	+	+
4.10	Fasten metal laths	+++	+++	++	0	++	++	++
4.10.1	Attach the metal lath to the 3/4-inch iron	+++	+++	++	0	++	++	++

Task 5 APPLY GYPSUM AND ANY OTHER DRY PANELS

No.	Operations and Sub-Operations	Same-level fall hazards	Fall-from-height hazards	Falling Object Hazards	Chemical Hazards	Ergonomic Hazards	Electrical Hazards	Noise Hazards
5.1	Interpret plans and specifications	0	0	0	0	0	0	0
5.2	Plan the work	0	0	0	0	0	0	0
5.2.1	Check the wall or ceiling composition	0	0	0	0	0	0	0
5.2.2	Check the type of material	0	0	0	0	0	0	0
5.2.3	Quantify the materials	0	0	0	0	0	0	0
5.2.4	Choose the type of scaffold	0	0	0	0	0	0	0
5.3	Check the studs	+++	+++	++	0	+	+	+
5.3.1	Check the spacing between studs	+++	+++	++	0	+	+	+
5.3.2	Check the direction of studs	+++	+++	++	0	+	+	+
5.4	Take measurements	+++	+++	+	0	++	+	+
5.5	Prepare the sheet	+++	+++	++	+++	+++	++	++
5.5.1	Mark the openings	+++	+++	++	+++	+++	++	++
5.5.2	Cut the sheet	+++	+++	++	+++	+++	++	++
5.5.3	According to the shape of walls, partitions and ceilings: - wet the sheet - apply joint cement for bonding	+++	+++	++	+++	+++	++	++
5.6	Apply acoustic or fire retardant sealants, if applicable	+++	+++	++	+	++	++	+
5.7	Make the first sheet level	+++	+++	++	+	++	++	+
5.8	Cut out the openings	+++	+++	+++	+++	+	++	++
5.8.1	Trim: - service boxes - door frames - trapdoors - ducts - etc.	+++	+++	+++	+++	+	++	++
5.9	Screw the panels	+++	+++	+++	+	+++	++	+++
5.9.1	Screw every 8 to 12 in. (ceiling, for example)	+++	+++	+++	+	+++	++	+++
5.9.2	Screw every 12 to 16 in. (wall, for example)	+++	+++	+++	+	+++	++	+++
5.10	Seal the joints to the exterior walls	+++	+++	++	++	++	+	+

Annex 3
COMMENTS BY MEMBERS OF THE INTERIOR SYSTEMS INSTALLER
PROFESSIONAL SUBCOMMITTEE

At the 54th meeting of the interior systems installer professional subcommittee, held on February 10, 2011 in Longueuil, the subcommittee members made the following clarifications:

Footnote 12, in Section 1.10, Development of the Trade, p. 11:

The subcommittee members have pointed out that there are also new framing products on the market. Also, new self-supporting systems made entirely with studs are appearing on the market, and require the use of SMAW or GMAW welding processes performed by interior systems installers. The use of those systems, stronger and larger, is bound to become widespread in construction.

Footnote 13, Table 2.1, p. 14;
Footnote 14, Table 2.1, p. 15;
Footnote 16, Table 2.2, p. 17;
Footnote 17, Table 2.2, p. 21:

The members think that:

- an operation should be added between 1.7 and 1.8 and should read as follows: “Install anchors (in one piece)”;
- operation 1.11 should be crossed out;
- an operation should be added in 5.11 and should read as follows: “Install framings (in three pieces)”.

Footnote 15, in Table 2.2, p. 17:

The members think that operation 1.10 should read “Install a screwing base, if applicable” and that the clarification of this operation should read “The screwing base is metal”.

Footnote 18, p. 41:

The members think that the DEP in *Installing Interior Systems* should be revised and that the program’s duration is too short.