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### CERTIFICATION OF DRAINAGE CONTRACTOR ENTERPRISES – EXPERIENCE IN QUEBEC

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**ABSTRACT** In 2003, AEDAQ (Association des entrepreneurs en drainage agricole du Québec Inc. - Quebec agricultural drainage contractors association) decided that the certification of drainage contractors would be a way to improve the drainage services offered by its members. AEDAQ asked the BNQ (Bureau de normalisation du Québec) to lead the process. The BNQ created a balanced committee of contractors, representatives of farmers and specialists from government, universities and private consultant to develop a consensual standard for services offered by drainage contractors. By 2005, the committee produced the BNQ-3624-540 standard describing the general requirements (insurances, permits, responsibilities, etc.) for each enterprise, the qualifications of its personnel, drainage equipment requirements, contracts specifications, litigation process and documents conservation. Based on that standard, a protocol was developed for the certification of drainage contractor enterprises. Ten (10) enterprises have been certified up to this date. This paper will present the process of writing the standard, the content of the standard, the certification protocol and the certification process which has been lived through by contractors and difficulties. The paper will also discuss the impacts of this standard.

**Keywords:** Drainage, standard, contractors, installation.

#### INTRODUCTION

Following the interruption of subsurface drainage subsidies to farmers by Quebec government in 1991, the drainage industry saw a rapid decline of subsurface drainage installations and the apparition of pessimistic perspectives for the development of a well organized and developed industry. This climate dominated the decade of 1990.

After some discussions in 2002, the Association des entrepreneurs en drainage agricole du Québec Inc (AEDAQ). (Quebec agricultural drainage contractors association) decided, for the survival of the industry and the quality of drainage installations, that the certification of drainage contractors would be a way to improve the drainage services offered by its members. AEDAQ asked the Bureau de normalisation du Québec (BNQ), an accredited standards development body to lead the process.

This paper will present the process of writing the standard, the content of the standard, the certification protocol and the certification process which has been lived through by contractors and difficulties. The paper will also discuss the impacts of this standard.

### **AEDAQ AND SOME HISTORY**

The AEDAQ is an association of drainage contractors in Quebec and associated members (tubing manufacturers, equipment dealers, services providers, etc). The association was founded in 1970 and has presently 13 members and 15 associated members. Its members employ about 300 employees and install about 7,5 millions meters of drain every year which is about 80% of agricultural drains installed in Quebec.

The subsurface drainage industry started in Quebec at the end of 1960, developed rapidly in the 1970 and reached some maturity in mid 1980. The majority of drainage contractors were self-made men with some farming and contractor experience. As a very new industry, they were full of new ideas (equipment) and initiatives.

With the withdrawal of the government from the subsurface drainage program in 1991 (ending of subsurface drainage subsidies to farmers), farmers lost interest in subsurface drainage and subsurface drainage installation decreased drastically in the following years. The drainage industry was depressed.

With the withdrawal of the government, subsurface drainage became a private matter without any support (technical or any other) and without any guidelines or requirements. It was a free business between farmers and contractors without any regulation. Professionals were rarely involved.

In the beginning of the 2000's, the drainage industry saw some revival with more interest of farmers and with the increase of installations. After some discussions in 2002, AEDAQ decided, for the survival of the industry and the quality of drainage installations, that the certification of drainage contractors would be a way to improve the drainage services offered by its members.

Because of the lack of any subsurface drainage guidelines in Quebec, the Commission de génie rural (agricultural engineering commission) decided in 1974 to write subsurface drainage guidelines based on experience and the recent research done at MacDonald College and Université Laval, both in Quebec. The first draft was published in 1977, the first official version was published in 1978 with revision in 1984 and the last version published in 1989 (CPVQ, 1989) with some corrections in 1990. The commission also published a subsurface drainage booklet (CPVQ, 1976) principally for farmers. If drainage contractors were not involved in the first edition guidelines, they were in the following editions.

In 1986, AEDAQ and the Quebec ministry of agriculture set up a subsurface drainage consulting committee composed of contractors and engineers from the ministry. That committee organized in 1987 a surveillance program of subsidized drainage installations. Young engineers were hired for visiting drainage installations and making recommendations. The program was financed half by the contractors and half by the government. The program lasted only three years and was dropped when the government dropped its subsidies. At that time, 25 enterprises were installing subsurface drainage systems. That program was known to improve the quality of installations.

## WRITING THE STANDARD

After contractors decided to go in the direction of certification in 2002, AEDAQ contacted the BNQ to discuss certification processes. The Bureau de normalisation du Québec (BNQ), is an accredited standards development body by the Standards Council of Canada (SCC). As such, the BNQ is authorized to develop consensual normative documents (Standards) up to the national level and to participate into regional (COPANT, PASC) and international standardization activities.

Different types of standards exist. They are principally standards for products such as drain tubing, standards for services such as drainage services and standards for organization management such ISO 9001 and ISO 14001. Standards for products are better known ; they specify how a product is manufactured, what are its dimensions, its properties and its requirements and how the product is sampled and tested. Standards for services specify the services offered, and may include organization requirements, human resource qualifications, equipments and procedures. The certification is made by an accredited organization that audits the enterprise and its documents.

The standard development process follows a very well defined procedure (BNQ, 2010). The accredited organization starts by doing an analysis of the subject or the request and does a feasibility study. The next steps are the preparation of a preliminary document and the creation a standards committee. This committee is a balanced committee of representatives from the interest groups concerned by the subject matter of the standard, typically representatives from concerned companies (suppliers); representatives of potential users and representatives expressing a more general interest mainly experts. With the BNQ's agent, the committee has the mandate to define the consensus and the draft standard in light of the consensus.

For this standard, the committee was composed of three contractors, the director of AEDAQ, four farmers (one of which was a representative of the farmer union) and four experts (two engineers form the Quebec ministry of agriculture, a private consultant and one university professor). One of the farmers was also an expert in drainage. Three representatives of the tubing industry were also invited as non voting members.

During the same time, AEDAQ created different groups to investigate different aspects of the industry such as equipments, laser systems, drain tubing, envelopes, personnel qualifications, enterprise organization, customer services and relation with agencies. Those groups made reports and recommendations that were the base of the standard. They also worked during the work of the standard committee.

The first meeting of the standard committee was called on December 4<sup>th</sup>, 2003 and the committee held seven official meetings. Some small group meetings were also held mainly for the writing purposes. The committee finished the draft standard by June 15<sup>th</sup> 2004. Then, BNQ did a linguistic editing, a proof-reading and an internal review which was aimed at ensuring that the draft standard is sufficiently precise and well-drafted, and that requirements specified therein are explicit enough to avoid any ambiguity.

Then, the draft standard was made available to the public enquiry for a 60 days comment period. The purpose of the public enquiry is to verify the acceptability of the proposed draft standard by concerned parties. It is also sent to a number of organizations (farmer union, government agencies) and parties (contractors) concerned by the subject matter who may wish to comment on document contents. The aim is to gather comments for the committee, extend the consensus and put the finishing touches on the draft standard by responding to the concerns expressed by the consulted parties. The collected comments

were discussed by the committee during two meetings in December 2004. A final version was produced and the consensus of the committee was then confirmed by a formal vote. Finally, the BNQ proceeded with the publication of the standard in May 2005 (BNQ, 2005).

### **BNQ-3624-540/2005 STANDARD**

The BNQ-3624-540/2005 standard (BNQ, 2005a) is defined in eight parts.

#### **Objectives and referenced documents**

The first two parts state the purpose of the standard and its application domain. The purpose of the standard is to define the requirements that must be met by enterprises offering agricultural subsurface drainage services. The domain of application is mainly in agriculture but is limited and mainly in Quebec. The standard is not limited to enterprises inside of Quebec.

The third part lists all referenced documents.

#### **Definitions**

The fourth part defines all special terms related to drainage or particular to this standard. It defines terms such as « argile sensible » (quick clay), « bouteur » (bulldozer), « caisson » (drain guide), « calibrage (gauging), « charrue taupe » (trenchless plow), « chef d'équipe » (foreman), « collecteur » (collector), « conductivité hydraulique » (hydraulic conductivity), « coute sous-soleur » (colter), « croquis d'exécution » (drainage sketch), « dérouleur » (unroller), « dossier » (file), « drain » (drain), « enveloppe filtrante » (drainage envelope), « équipements de drainage » (drainage equipment), « étalonnage » (calibration), « goulotte » (drain guide opening), « granulométrie » (particle size distribution), « nivellement » (land leveling), « plan de drainage » (drainage plan), « registre » (register), « rétrocaveuse » (backhoe), « sortie de drain » (outlet pipe), « système de guidage laser » (laser guiding system) and « terrassement » (land terracing).

#### **Enterprise commitments**

The fifth part presents the enterprise commitments in three groups. The first group deals with the basic commitments such as respect of drainage guidelines (CRAAQ, 2005), always sign contract with clients, protect the environment when making installation, use safety rules to protect the personnel, use proper equipment and keep the equipment in good conditions, use quality material which respects standards, document and treat all client complaints.

With the second group, the enterprise must have a permit from Régie du bâtiment du Québec (government building regulatory corporation), be registered to the Commission de santé et sécurité au travail (government safety corporation) must have an insurance policy of minimum one million dollars and must give to every client all permit numbers.

The last specifies the elements that must be present in the contract with the client. The contract must specify payment conditions, the quantity and cost of materials and costs of installation so as the final bill and costs of modifications can be easily established based on stated costs. The contract must be signed before any work starts. The contract must also include the address of the enterprise and all permits and certification numbers, the address of the client, the location of installation work, the time frame of the installation, the description of works, the area drained, the approximate length of drains and collectors, list of special works, the equipment type to be used, the detailed costs (total,

installation, tubing, special works and supplementary) and any negotiated conditions. The contract also includes the responsibilities of the enterprise (respect of the subsurface guidelines, use of qualified personnel and appropriate equipments and respect of price, file of works done and plans installed drain and use of certified BNQ tubing) and the client must be solvent, obtain all required permits and pay half of any litigation costs.

### **Personnel**

To offer a good quality of services, the competency of the personnel is one of the most important aspects. Because organization of team work is different from one organization to another, the qualification of personnels was defined in term of functions and responsibilities which are foreman, trenchless plow operator, backhoe operator, laser system operator and technician. For each function and responsibility, the competencies required are defined and documents certifying those competencies are defined in terms of training classes, experience, exams, diploma, etc. Table 1 presents competencies and documents and activities certifying those competencies of the trenchless plow operator.

Table 1. Competencies and certification for the trenchless plow operator.

Competencies	Activities or documents required
Able to operate the trenchless plow, detect malfunctioning and make adjustments.	Certificate of successful result at the exam.
Know the functioning of laser systems, able to install a laser station, able to operate and check the functioning of the laser station.	Certificate of successful result at the theoretical and practical exam.
Have a basic knowledge of subsurface drainage systems.	Certificate of successful result at the written exam.

For each competency, a certificate of competency is delivered by an accredited organization. The standard specifies that a committee of a minimum of three experts approve each training program and exam offered by an organization. The list of accredited organization is included in the certification protocol.

To show the competency of its personnel, each enterprise must keep, for each employee, an up-to-date file with certificates and training classes and an up-to-date register. Each enterprise must also keep up-to-date manuals, documents, procedures describing the functioning of equipments and training material.

### **Equipments**

Each enterprise must use a backhoe, an unroller, a laser system and equipments able to drain clay soils, sandy soils and rocky soils. To drain those soils, the contractor must use a ladder-chain type or a wheel type trencher or a drainage plow mounted on a minimum 175 kw bulldozer with minimum 76 cm tracks width and a minimum 175 kw bulldozer with minimum 56 cm tracks width able to pull the other bulldozer with its plow. For plows, minimum and maximum widths of the drain guide and minimum and maximum widths of the blade are specified for each tubing size. The minimum capacity of hydraulic pump must be 75 l/min (20 US gal/min) at a minimum pressure of 13 800 kP (2000 psi).

The characteristics of the laser system as well as the location of the receptor on the plow are specified. A slope control and a power feeder are required for the plow.

Special equipments are also specified for draining peat soils and sensitive clay soils. Those equipments are optional and they give access to a special certification.

### **Customer services**

The customer service section specifies the after sales services (drainage plans, drainage sketches of installed systems, repair required, bills, meeting the client, etc.), the litigation process of complaints. If an enterprise cannot resolve a conflict with its client, it must resort to an independent arbitrator and each party must pay half the cost.

### **Documents conservation**

The document conservation section specifies the documents that the enterprise must keep in its files (contracts, plans, complaints) and how those documents are handed.

### **Other aspects**

One important aspect to consider when writing a standard is that any requirement must be easily checked. If the standard describes the present requirements in accordance of the present knowledge, it must also be written in such a way as to allow improvements made by the industry and deals with new equipments. For new equipments, or equipments not included in the standard, the standard specifies that a committee of a minimum of three experts is created to analyze the case, determine the test procedure if needed and decide on the case.

## **CERTIFICATION PROTOCOL**

The confirmation that an enterprise meets a standard must be done by an accredited organization using a published protocol based on the standard. BNQ is accredited by the Standards Council of Canada and was mandated to certify agricultural drainage contractor enterprises. BNQ created a committee to help him define the certification protocol. The committee was composed of two farmers, two contractors, the director of AEDAQ, and three experts. The certification protocol BNQ 3624-940/2005 (BNQ, 2005b) is based on document NQ 9902-001 *BNQ Rules of Procedure* (BNQ, 2002) which seeks to clarify the rules of procedure contained in the document NQ 9902-001 and sets forth the specific conditions linked to the BNQ-3624-540/2005 standard (BNQ, 2005a) for involvement by the BNQ along with the specific requirements with which the enterprise must comply in the framework of the certification program concerned.

The protocol committee was held on March 15, 2005. Then the certification protocol draft was made available to public consultation for 30 days comment period and BNQ 3624-940 certification protocol was published in September 2005.

Since this publication, two amendments have been done to the 2005 edition of the BNQ 3624-940 certification protocol.

## **TECHNICAL GUIDES**

The last subsurface drainage guidelines (CPVQ, 1989) was considered outdated by the time the committee was called. Therefore, a small work group was created to write a technical document containing subsurface drainage guidelines aimed principally at

contractors and their technical personnel. The work group was lead by AEDAQ with the contribution of engineers from government and a private consulting group.

The document (CRAAQ, 2005) was revised by experts and published by Centre de référence en agriculture et agroalimentaire du Québec (CRAAQ). The document treats field investigation, design, envelop, auxiliary works, environment aspects, water table control, sub-irrigation and pumping station.

AEDAQ also wrote and published a document (AEDAQ, 2005) that presents the good use of laser equipments and drainage accessories. Both documents are referenced in the standard and can be revised without requiring the modification of the standard. The objective was to separate the technical part from the more legal part of the standard.

## **CERTIFICATION OF ENTERPRISES**

Following the publication of the standard, required training programs for managers, trenchless plow operators, backhoe operators, laser system operators and technicians were prepared by reliable organizations and then evaluated and approved by the BNQ. The evaluation of the training programs was done by a committee of three experts, which meets as needed. Close to 400 employees registered for the training programs (more than one program in some cases) and took exams to prove their competency. Training classes were delivered mainly in 2006 and 2007.

The enterprises took the whole of 2006 and part of 2007 to prepare for the certification process. They had to prepare all papers, update their files and implement missing required procedures. In order to get a certification, the enterprises had to fill up a request for certification and provide to the BNQ information about the type of soils for which they seek certification, qualifications of their personnel and of their equipment attributes. Following the application, an inspector visits the enterprise, checks all documents and requirements. When requested, the enterprise has to make some modifications to fulfill the requirements. For the case where the equipment was not listed in the standard, the BNQ experts committee was asked to evaluate and make a recommendation to accept it or not.

The first enterprise was certified on June 18, 2007. Eight enterprises were certified by the end of 2007. Two other enterprises were certified in 2009 and by March 2010, ten enterprises were certified.

## **EVALUATION**

The process took five years between the decision taken by AEDAQ and the time where the first enterprise was certified. The preliminary work took about one and half year, the writing of the standard took one and half year and the certification process of the first enterprises took two years. The process took a lot of energy and cannot be done overnight.

The standard had some outcomes. The identification of the reliable training organizations for the different training programs and the approval of those programs. It brought great improvement to written contracts between contractors and its clients. The contract model is still in evolution. In addition to the required training of specialized employees, the enterprises also set internal training programs for the employees such as bulldozer operators, unroller operators, backhoe operators and helpers. This brought pride to employees in their work. In 2009, the need for new technicians arose and a new training program was developed and approved.

The arbitration procedure specified in the standard was used in one case and helped to resolve the conflict to the satisfaction of both parties.

During the work of the standard committee, the need to revise the drainage tube standard arose and a revised standard was published in 2007 (BNQ, 2007). The major improvement was the standardization of the fittings.

With the certification of drainage enterprises, AEDAQ went to lobby government organizations, banks, credit organizations and farmer organizations to convince them of the value drainage works done by BNQ accredited enterprises (the easy part) and to make it part of their policies or requirements (the difficult part). Some organizations are slowly starting to specify work done by BNQ accredited enterprises.

In reference to this certification program, the BNQ often mentions that the main cause of success of this certification program is related to the fact that AEDAQ assured that its members comply with the program requirements before the process of certification by the BNQ. One of the key factor of the assistance provided by AEDAQ to its members was the development of a Coaching Guide.

## **CONCLUSION**

In 2002, AEDAQ decided that the certification of drainage contractors would be a way to improve the drainage services offered by its members. The first step was realized in 2005 with the publication of the BNQ-3624-540/2005 standard (BNQ, 2005a) and its certification protocol BNQ 3624-940/2005 (BNQ, 2005b). In 2007, eight enterprises were certified. Ten enterprises are presently certified.

The process took a lot of energy but the certification is considered as an added value to drainage contractors. Close to 80% of agricultural drains installed in Quebec are by BNQ certified enterprises.

The standard and the certification of enterprises certainly improved the quality of drainage installations. It definitively improved the training of the personnel and the contract model. The standard also sets the framework for the improvement of the whole industry not just individual contractors.

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