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PLAN ASSURANCE QUALITE FOR AN INSTALLATION CONTRACT

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Abstract

The current ST/EL group's installation and maintenance contract expires on June 2001. Official procedures for a new contract began a few months ago. Once the new contract has been adjudicated, contractor firm should establish a Quality Assurance Plan (PAQ) within 6 months to be approved. This PAQ is the essential main instrument which ST/EL group has in order to assure a perfect achievement of signed contract. PAQ efficiency depends on its good knowledge and its permanent application on the part of the contractor firm and especially on the part of ST/EL group. The acquired experience during last PAQ should be reflected in the future contract.

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1 INTRODUCTION

Following the general CERN policy, certain groups in ST division have an external contract to accomplish their activities. The contractor firm carries out the activities requested following the Technical Specification requirements. Within this Technical Specification, Quality Assurance Plan and any ISO certification are generally required. Normally, contractor firms have a quality system (requested in ISO standards) and are used to working following quality plans.

However, contract users are aware of the ISO standards but no real knowledge about what a Quality Assurance Plan is , reasons for having it, ownership and above all how to apply it. This note tries to clarify these inquiries and others problems relating to this subject, from the point of view of applicable International Standards (ISO) and the experience acquired during the last ST/EL group contract for installations and the related quality plan.

2 INTERNATIONAL STANDARDS

A quality plan should be consistent with the different exigencies of the applicable international quality standards. The customer in the technical specification must specify if particular standards are required and have to be included in the quality plan.

The most applicable international standards about quality aims can be found in the ISO standards. Thus, all quality terms are defined in detail in the ISO 8402 and the ISO 10005 describes guidelines that should have a quality plan.

In this context, a frequent mistake is to think that a firm having an ISO 9000 quality system then quality is assured or its quality plan will be better. In fact, a firm having ISO 9000, it means they are capable to detect any divergence in a project, a product or a contract, analyse it, and take the adequate corrective actions in order to avoid the recurrence of the problem.

In contrast, it's possible a company does not have ISO 9000 certification but supplies an alternative quality plan which it practices.

2.1 Quality plan definition.

A general definition of a Quality Plan is given by ISO 8402: "*document setting out the specific quality practices, resources and sequence of activities relevant to a particular product, project or contract"*.

Depending on the scope of the plan, qualifiers like *assurance, management...* may be used. In the particular case of the ST/EL group contract, the scope of the plan is obviously to ensure the quality in the activities inside of the contract. Thus, ST/EL group has a well-known Quality Assurance Plan.

2.2 ISO 10005: general guidelines

The supplier prepares the quality assurance plan. The quality plan should be as brief as possible understood by everybody. If the supplier has a documented quality system it could make reference to its quality manual.

The quality plan should be reviewed and formally approved by an authorised group that includes representatives from all affected functions within supplier's organisation. In contractual situations a quality plan may be submitted to the customer for review and acceptance.

This standard makes a particular remark when a quality plan is required by a contract (the most usual at CERN). In this case, the quality plan should be submitted to the client before starting the required activities.

The supplier should revise the plan when appropriate, to reflect changes to the way of product is produced or service is provided, or changes in quality assurance practices. The same authorised group that made the original plan should review these changes to the quality plan for impact.

3 BASELINES OF A QUALITY PLAN

In this section, the main outlines, that a quality plan should include, are to be enumerated. Basically, the contents of each particular quality plan depend on the contract signed by the two parties (customer and supplier). These contents should be based on the ISO 10005 and on the supplier's documented quality system. It's not necessary the quality plan follow the structure of any ISO 9000 standards but it should be above all easy to use and understand.

The scope of a quality plan should include in addition to the requirements of the product, project or contract, the intended quality objectives the conditions of its validity and specific exclusions. The quality objectives represent the most important aims of a quality plan, in order to be able to assess the quality plan performances. If possible, the quality objectives should be defined in measurable terms.

Finally and as orientation, a quality plan should clarify or make any reference to the following aspects:

- Organisation and responsibilities.
- Contract appraisal.
- Design and execution control.
- Document and data handling.
- Purchasing.
- Customer product management.
- Tests control.
- Nonconformity management.
- Quality audits.
- Human resources.

4 ST/EL QUALITY ASSURANCE PLAN

The ST/EL and ST/TFM groups manage contract C137/ST for electrical installations, the same was signed by the Joint Venture consortium. A quality plan was required by CERN in the technical specification. This plan was approved in June 1997 one year after the contract was signed.

The main objective of this plan is to apply and ensure quality in all activities entrusted in the C137/ST contract. The plan is based on the ISO9001:1994, and the followed structure is given by NFX-50164 standard.

The plan encloses the following applicable documents and standards:

- CEI standards
- UTE standards
- General Prescriptions edition 94 (CERN)
- Specification technique included in IT-2246 ST document
- Notes de Fonctionement (NdF)

4.1 "Notes de Fonctionnement"

The firm's quality system is based on a specified quality plan and on the "Notes de Fonctionnement". Thus, most of the contract procedures (applying ISO instructions) within the quality plan are systematically referred to these notes.

The “Notes de Fonctionnement” are established for the users, verified by quality manager and approved by the Operational Direction; if any “Note de Fonctionnement” must be reviewed the identical standalone way is allowed.

Notes de Fonctionnement are symbolised by the letters NdF, followed by a number that corresponds to the chapter of the more similar ISO 9001 standard.

4.2 Organisation

In the quality plan, the following roles and responsibilities can be found:

a) Project leader: consisting of Direction Committee, which its aim is to request for responsibilities and decide the actions to be followed in case of discord within the contract terms.

b) Project manager: his/her responsibility consists of administrative and financial contract management. He/she must report to the Committee about any conflict within the contract and he/she will make apply the correctives actions decided by the Direction.

c) Operational Direction: attached to the project manager is responsible for the quality plan and its application. The scope of Operating Direction consist of the contract being achieved, i.e. human resources, provisions, working procedures, storage...

d) Coordination: is the link with CERN, collect the whole information from CERN and launch the projects. Responsibility: the correctly execution of contract activities.

e) Quality manager: attached to Operational Direction, assists to the Operating Direction in the application and verification of the quality system, and is quality link with CERN. Responsibility consists in following the quality corrective actions to be applied.

4.3 Quality plan administration

The quality plan is established and approved by the Operational Direction, already mentioned. The diffusion of the plan is carried out with attachment of a receipt to all CERN requestor. An annual revision of the PAQ should be carried out in the presence of the Direction Committee, the project manager and the Operational Direction. The end pursued by this annual revision is to verify the adaptation of the dispositions of the quality plan according to these four items:

- review the actions undertaken since the last meeting
- analysis of conflicts and actions to be accomplished
- balance of different audits
- objectives in matter of quality

In this meeting no one is found representing CERN. The minutes of this meeting are distributed to the participants therefore CERN is not informed.

4.4 Applying the plan

This section shows, as the ST/EL quality plan should be applied to a practical example. Generally, a client requests an electrical installation to ST/EL group. Thereafter, this task is assigned to a ST/EL manager who gets in touch with the contractor coordinator. While a meeting, all required works are described and planned with the contractor coordinator. The coordinator shall prepare a budget, which will be transmitted, to the ST/EL manager. Once the client accepts the budget, the ST/EL manager prepares the order (OSVC).

When the order arrives, the coordinator starts a study (if necessary) for the required works. Once he has completed the study, he sends it to the ST/EL manager for approval. If the ST/EL manager approves it, he prepares the execution order (OSE). Once the contractor receives the OSE, a meeting between the ST/EL manager and the contractor works officer (chef de chantier) is imposed by the plan. In this meeting, a contract review is done and the *chef de chantier* reflects in a specified form included in the plan. After the contract review, contractor sends an acknowledgement of OSE receipt with theirs remarks during the contract review or with a copy of the contract review form.

During a project, discrepancies are normal. The quality plan has foreseen a form called "*point d'alerte*" to indicate possible divergences. This *point d'alerte* is the approach to be used by contractor and ST/EL manager, to communicate any unexpected problem, needing, disagreement or even recommendation to the other part. A *point d'alerte* does not mean a deficient work or non quality procedure by one of the parts, only it remarks to the other part the situation. *Point d'alerte* exchanges are possible by all the parts since a command is arrived to the contractor.

Point d'alerte handling is defined in the plan. Once it is sent the other part must answer quite quickly the decision taken or the action to be undertaken. If the part who established the point d'alerte disagrees with the suggested solution, a meeting between all parts is imposed according to the quality plan (otherwise the *point d'alerte* is removed). After this meeting, if non-agreement, activities may be stopped and situation is communicated to Direction Committee. All *point d'alerte* have a computer follow-up.

Between the client request and the end of installation, modifications, changes and unexpected situations are usual and habitual (we do not forget we are in a research laboratory). In this background, the plan has a defined procedure to manage modifications during a project. A special form including the required significant modifications should be sent to contractor in order to carry them out. The handling of this form is the same than *points d'alerte.*

When works and installation have been finished and tested, the contractor remits a form (sheet 10.1) that includes a list of documents to be delivered and the date of the installation return. In this moment, CERN shall make use of the installation (never before this form has been received). The ST/EL manager will sign this form if agreement and will send the form to contractor.

In the next days, ST/EL manager shall receive the complete installation documentation (plans, cablotheque, CAD files, materials used...) according to the definitive installation and now again the form 10.1. Then, he will return signed the form to the contractor (and save for himself a copy) to be classified and to begin the warranty. The command will be closed and paid in the month.

If required work is urgent, quality plan gives a single form to supply to the contractor that allows firm to launch works immediately. This way requires imperiously a budget code and the owner's signature. Thereafter the usual procedure continues but works have already started.

4.5 Experience

The firm generally follows quite properly the quality plan since it was itself that establishes the plan. In the annual contract meeting, the plan quality is appraised among other aims. Generally there have been not major problems. However, when contract users are asked some interesting remarks are found. The most frequent ones are as follows:

- missing human resources during the shutdown; as result an unsatisfactory service is given
- inappropriate qualification for specified works
- difficulty achieving a fixed planning
- deficient coordination and follow-up of different activities

However, the reality shows that a single part of contract users know and use correctly quality plan. In this context, the contractor quite often criticises contract users (ST/EL and ST/TFM groups) by not respecting the quality plan instructions. As well, contractor knows this situation and try to profit from it.

Table 1
Statistics for the ST/EL quality plan (from 1 July 1999 to 30 June 2000)

	Revue de contrat	Travaux urgents	Points d'alerte CERN	Points d'alerte entreprise	Points d'alerte TOTAL
LHC	21	0	10	*10*	20
Câblage SPS	131	6	1	*30*	31
Services généraux ST/EL	222	38	19	*34*	53
Services généraux ST/TFM	336	18	36	*51*	87
Câblage PS	154	8	18	*47*	65
Maintenance ST/EL	-	-	41	*106*	147
Maintenance ST/TFM	-	-	97	*225*	322
Bureau d'études	200	0	0	*23*	23
Total	1064	70	222	526	748

Contract users do not use any quality plan procedures (in particular *points d'alerte*), because they think that these instructions are useless and non-practical and delay projects.

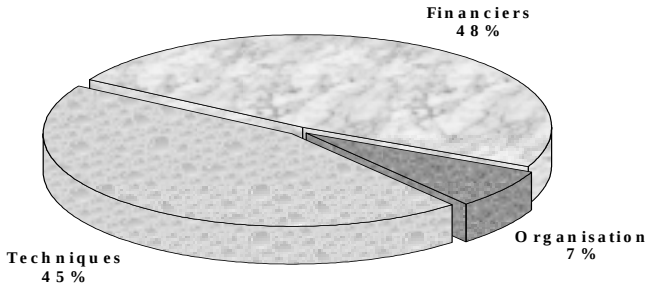
The **table 1** illustrates quality plan statistics classified by activities and presented during the last annual contract review. These statistics allow presuming that:

- urgent works procedure were reasonably used regarding normal procedure
- points d'alerte were not often used by contract users
- by activities, maintenance contract users seem to know and apply the quality plan
- contractor design office worked rightly

Fig. 1 gives an idea about the real nature of *points d'alerte* and provides a new assumption. The main use of *points d'alerte* was used to signal financial aspects and not technical aspect as it could be expected. Thus, it could help us to change the false image we have about *points d'alerte*.

I would like to remark that all these statistics are supplied by contractor, and nobody within ST/EL group supervises quality plan statistics.

Fig. 1: Distribution of points d'alerte according to use.



5 CONCLUSION

In general, a quality plan should include all contract requirements and contractor responsibilities. Furthermore, it should be understood by everybody. The plan should become the handbook including the rules and regulations, which are to be applied by the contractor in order to carry out the activities within the contract. If a contract user has any problem with the firm or contractor, he should find inside the quality plan the person to who address and the procedure to be undertaken. Even if this person does not understand the procedure, he must contact the quality linkman to explain it.

On the other hand, the quality plan is the applicable instrument to manage the contractor and its quality. We must realise that the plan is usually a mirror image of the technical specification. In addition, all aspects not included in the technical specification are quite difficult for CERN to be applied by the firm within the contract. For this reason, contractors do not prepare an efficiency quality plan, they just include the most important requirements given by the technical specification. If someone wants imperatively that any special procedure or activity is included in the quality plan, this person will have to specify clearly in the technical specification. Thus, CERN should pay special attention to the preparation of the technical specification.

Finally, the plan should be known and applied by all contract users within the group. But it's obviously the final client who suffers unsatisfactory services so that affects directly in our group credibility and capacity.