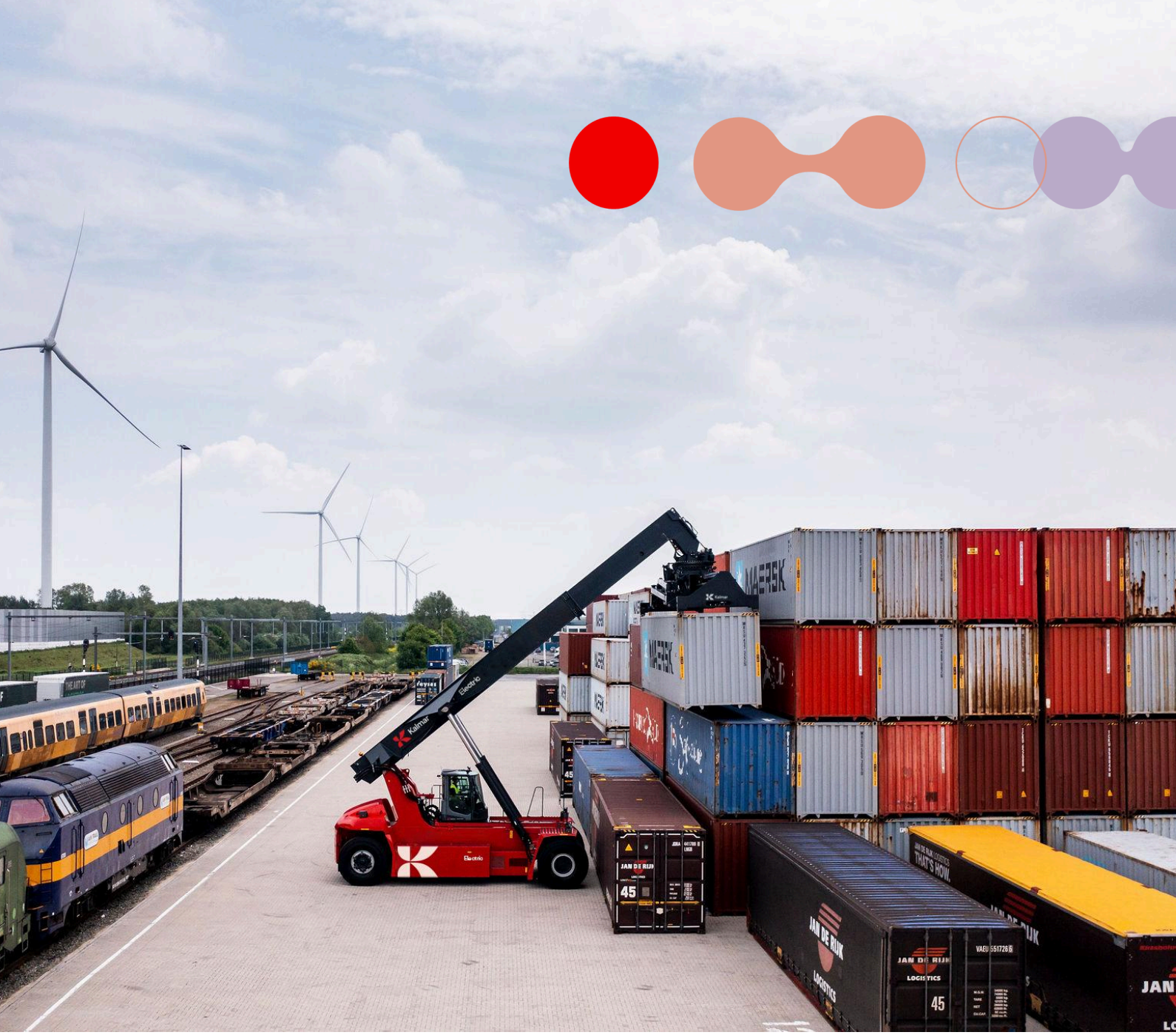

Kalmar Supplier Quality Manual

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About the Supplier Quality Manual

The purpose of the supplier quality manual is to clarify our values, expectations, requirements and the way we work to facilitate the long-term relationship with you as our supplier.

It clarifies what is expected from you as a supplier, from qualification through becoming a supplier who delivers approved serial production parts to Kalmar.

The aim is to ensure that suppliers have the appropriate understanding and ability to fulfil all requirements associated with providing the right quality and on-time deliveries at the lowest total cost.

The manual should guide suppliers in the direction that is required to develop their systems and structure for sustaining the requirements from Kalmar.

However, it does not overrule any signed agreements, project specific documentation, drawings, specifications, standards and/or instructions applied to specific products.

Supplier Acknowledgement

We hereby confirm that we have received the Kalmar Supplier Quality Manual and understand the requirements in this document.

This Manual defines the overall targets, ways of working and requirements for supplier relationship with Kalmar . This document, from now on, will be included in individual supplier agreements including general agreements entered into between Kalmar and the supplier prior to establishing a business relationship.

Kalmar expects that by signing this document, the supplier commits to customer satisfaction, continuous improvements and zero defects.

Information in this publication is subject to change without notice. It is the supplier's responsibility to keep updated about the latest targets, way of working and requirements, while it is Kalmar’s responsibility to ensure that the latest revision is communicated and available to the supplier. For significant updates a new signing may be required, while minor changes are done with the expectations that the supplier will adhere to those updates.

The latest revision may at any time be requested from your sourcing or supplier development contact.

Any copies of this Supplier Quality Manual distributed to suppliers, printed or downloaded, are considered uncontrolled and will not be automatically updated. Always check the latest version

1. Introduction

The Kalmar Sourcing mission is to provide competitive advantages and to increase productivity throughout the total value-chain by selecting, developing and managing suppliers to deliver the best possible value to our customers in terms of Quality, Delivery, Cost and Innovation.

We are selecting our suppliers based on their performance, capability and attitude to continuously improve the customer value and we are developing strong and structured relationships through the professional supplier relationship management.

We are continuously improving the organisation, processes, attitudes and skills of our employees in order to perform the very best in every interaction with our suppliers.
Our target is to be committed to excellence in what we do, keeping the customer in focus to create added value, minimise variations and have a continuous improvement approach to increase customer satisfaction and value. We encourage our suppliers to adopt the same principles.

Everyday we live by the attitude of zero defects and require our suppliers to demonstrate their support by acknowledging standard work, continuous improvement and a zero defect philosophy

“By close cooperation with our preferred suppliers, we can create stable and waste free processes, which will let us move towards Zero Defects by continuous improvement and as an extension reduces expenses, increase profitability and adds customer value.”

The expectations are that our suppliers demonstrate adherence to this through:

- Always delivering conforming parts, in the correct quantities and at the right time.
- Respect the importance of approved and stable processes.
- Continuously focusing on productivity improvements and waste reduction.
- Showing a proactive approach in everything we do.

2. General Requirements

2.1 The way we do business

The way we do business is built on the idea that every business transaction should be performed with fair play, using an open mind and focus on customer needs and requirements.
We are keen on utilising the knowledge and experience of our suppliers, with the intention to bring added value in terms of high level communication and cooperation from early involvement with new product development to solving end customer issues.

2.2 Performance excellence

Our core values are derived from a performance culture based on a customer focus and continuous improvement. We are committed to honour these values in everything we do.

Quality

We live by the philosophy of zero defects and quality first, philosophies transferred down the supply chain as quality requirements towards our suppliers.
We expect our suppliers to work with continuous improvements towards zero defects as part of their pursuit for perfection.

Delivery

We keep our promises to all of our stakeholders, as well, in our communication and cooperation with our suppliers. When we promise something we put great honour in delivering the result in the right time and if applicable in the right quantity. We expect our suppliers to honour and live by the same requirement.

Cost/Productivity

With relentless pursuit for perfection we continuously strive for a waste free environment in our assembly as well as in our administrative processes, which continuously allows us to increase our productivity and reduce costs of poor quality. We urge our suppliers to adapt the same principles in order to reduce expenses, increase profitability and add customer value.

Innovation

Trying to be more efficient and customer focused it is important to question old habits and to find new solutions for different challenges.
Our suppliers are requested to continuously explore the possibilities of doing things smarter or differently to increase customer value and profitability, without compromising Quality , Delivery and costs.
We expect close and early technical cooperation on new technologies and for new products.

2.3 Expectations

We expect our suppliers to have a clear mind-set that today's behaviour is not good enough tomorrow, meaning that we all need to continuously improve ourselves and our companies towards a waste free and stable cooperation.

In order to build a long-term relationship our expectations are that you live by and honour a few basic principles:

Conformance to requirements

Quality is conformance to requirement and planning for that quality to be delivered in everything you do is a vital activity to assure customer expectations.

Communication

The single most important and as it seems most difficult part of a healthy relationship is timely and fact based information. Communication shall be done proactively and not reactively in every case. Whether potential problems are identified in the design phase or if problems occur in the manufacturing process, it should always be communicated early and in advance to avoid late surprises and unnecessary complaints.

Clarity

In some cases information might not be clear for everyone. If such situations arise, never hesitate to react and request clarification. When all parties have the same understanding of expectations business will run smoother.

Challenge us

If something does not make sense, challenge it! Some things have perfectly good explanations, but other times one tends to only see what is in the box and an additional point of view will be beneficial for all.

Customer focused

Try to understand your customers and what is important for them. Always communicate early and clearly about potential improvement ideas as well as potential issues.

Continuous improvement

Working with daily improvement activities, reducing waste in every working area as well as in every business process is what guides us to excellence. Focusing on continuous improvement will improve performance, reduce costs and thus increase customer satisfaction and profitability.

Cooperation

We cannot achieve required performance and customer satisfaction without the support and expertise of our suppliers. Cooperation across the supply chain is a key success factor and must never be neglected. Always apply the above principles in every interaction with us

2.4 Requirement

All key general requirements of our suppliers are summarised in the Kalmar Supplier Requirements, and should be provided by our Sourcing or Supplier Development representatives.

3. Supplier Approval

In order for a supplier to be awarded business with Kalmar, it is compulsory to pass the supplier approval process where the supplier is assessed and evaluated on business and component specific requirements.

3.1 Pre-evaluation

The Pre-evaluation is always performed on potential suppliers based on Kalmar Category decisions. It is done to create an understanding of whether the supplier fits our strategic intent. The intention is to ensure that supplier machines, tooling, competence, preliminary layouts, specific machine capacities and overall capacity is aligned with the current and future needs of Kalmar.

Suppliers' basic capabilities and potential are evaluated and included, but not limited from evaluation are:

- Quality
- Sustainability
- Health and Safety
- Management
- Location
- Ownership
- Financials
- Prices
- Size

Information and decisions about evaluated suppliers is always added into the Kalmar Common Sourcing System, with reason for Go/No-Go decision added.

3.2 Assessment

An assessment is far more extensive than the pre-evaluation and is evaluating all aspects of the supplier and its performance from a holistic point of view. It is done to give an overall understanding of the suppliers' capability to meet our requirements, but also to determine the potential risk areas connected with a supplier.

The assessment's criteria are based on the Kalmar Supplier Requirements, which will be provided to you in advance by our Sourcing or Supplier Development representatives.

The assessment is compulsory to pass for all new suppliers before becoming an approved supplier and being awarded business by Kalmar. Once approved, the trigger for re-assessment is according to certain predefined conditions.

Trigger for an assessment is based on our Category team decision, but always in following cases:

- New suppliers or existing suppliers expanding into a new category
- Supplier is changing location
- Kalmar is significantly increasing business with supplier
    - change of design responsibility,
    - business value, (~25% grow year to year)
    - new technology,
    - change in business scope (portfolio of products),
- Supplier ownership is changing

If any of the above criteria is fulfilled after you have been approved, we urge you to in advance contact your sourcing/or supplier development representative to schedule a reassessment in order to avoid any potential delays.

3.3 Supplier Status

The outcome of the assessment is documented in the Kalmar Sourcing System which results in the supplier qualification status used for all businesses within Kalmar.

- **Approved** - Supplier is approved to begin doing business with Kalmar.

- **Approved with corrective actions** - Supplier can begin doing business with Kalmar, but only after providing and committing to a realistic plan to fulfil found non-conformities. Kalmar will follow up on implementation of the action plan prior to final approval and has the right to withdraw business if the plan is not fulfilled within a reasonable timeframe.

- **Disqualified** - Supplier is disqualified and is not allowed to begin doing any business with Kalmar. No further actions or support will be provided by Kalmar to develop the supplier.

4. Request for Quotation

The first stage of assuring an understanding of the requirements and eventually the quality delivered by the manufacturing process is the Review of Technical Specifications (RTS) that suppliers shall respond to in every quotation.

4.1 Review Technical Specification (RST)

The review of technical specifications is included in the RFQ package and must be reviewed, signed and attached when submitting your quotation. If no RTS is submitted a disqualified quotation may be the result.

The purpose of the RTS is to ensure that the suppliers have received and reviewed all specifications, standards, regulations and instructions related to the specific part or component included in the RFQ, in order to be able to quote based on the correct information.
The supplier is also asked to provide feedback on acceptance or request for a discussion, as well as, making proposals for improvements and alternative solutions and their impact to quality, delivery and cost.

If there is any additional information or clarifying comments suppliers are asked to submit those at the same time.

5. Quality Assurance Plan - QAP

The Quality Assurance Plan is a structured way of planning for quality that involves a series of activities to assure conformance to requirements. It is used to assure that the engineering design records and specification requirements are properly understood by the supplier and that the production process employed by the supplier will consistently produce products according to the specifications.

The extent of the QAP is a Kalmar decision and is set for each part or part family based on criteria such as part criticality, part complexity, supplier track record, etc, and will look different from case to case.

QAP is required for:

- New parts
- Design changes
- Process changes

Prior to the start of serial deliveries all requirements in the QAP must be fulfilled by the supplier, and an approval to start serial delivery will be made via a signed/approved PSW (Part Submission Warrant).
Kalmar uses the PPAP AIAG Standard, depending on the reason for the QAP and complexity of the parts the requested documents are defined by Kalmar and shared with the Supplier through the Kalmar System. The supplier will have access to upload requested documents directly into the system.
If you do not have access to the System, please contact your Sourcing or Supplier Development contact person

Support templates for each activity are available and can be provided by Kalmar upon request.

5.1 QAP Gate 1 (Initiation - Specifications and requirements)

During initiation, requirements, expectations and risks will be reviewed, mitigated and signed off for a gate approval before the supplier is allowed to move on to the next phase.

Customer specifications & requirements

All relevant standards, drawings at the latest revision and other requirements which are valid for the product are to be stated and supplied by Kalmar.
Suppliers shall review to ensure that all necessary documentation to manufacture the parts is available.

Review of technical specifications

This is the review where the supplier and Kalmar jointly discuss all requirements and agree on the expectations. It is important that this review is performed jointly between the supplier and Kalmar technical representatives. ***Prior to this review the supplier shall have performed a thorough review at the RFQ / quoting stage.***

If some requirements cannot be fulfilled by the supplier an engineering change request (ECR) should be initiated by the supplier. Any discussion that may lead to updates of specification based on Kalmar initiatives shall be agreed and documented on an action plan.
All changes needed to the technical specifications must be done within Gate 1. If that is not a timely possibility an interim recovery worksheet must be established. It is important to note that all changes will be documented and approved by Kalmar R&D.

Production Part Approval Process

A PPAP is part of the QAP process where the QAP defines what activities the supplier needs to carry out in order to get the result that shall be presented in the PPAP documentation. The PPAP schedule clarifies the requirements in terms of expected documentation from the supplier and must be submitted together with the part submission warrant (PSW).
For a successful QAP it is crucial that everyone understands the connection between actual actions and activities that will lead to the documentation reflecting the reality (PPAP).

The PPAP schedule will also set the expectations about when initial samples must be available at the concerned site for review prior to giving the approval to start serial production.

Risk analysis

The supplier shall create an overall risk analysis of the “project/QAP”, where all potential risks and threats are highlighted. In addition, the supplier must analyse what can be done to mitigate the risks identified in order to reduce and eliminate the potential consequences.

Supplier feasibility commitment

The supplier shall sign their commitment to the QAP plan, where compliance to both the specification and the time plan is performed.
The team feasibility commitment is to be signed by Supplier representatives from Management, Production, R&D, Quality and Sales.

Gate approval

A gate approval, that confirms that the supplier has performed all necessary activities in the initiation phase and can meet all requirements, is to be signed by Kalmar representatives.

5.2 QAP Gate 2 (Planning-Documentation review)

The planning phase facilitates a smooth introduction by the supplier and Kalmar reviews documented progress to ensure that requested activities are carried out as committed in Phase 1

SOP plan (start of production plan)

The supplier is required to present a time plan that describes when the different parts/components will commence serial production and delivery and includes a ramp up plan.

Process flowchart

The supplier will present a Process flow chart that describes, in detail, the process flow design. Also included are what part numbers are incorporated into the various process steps.
The Process Flow chart shall clearly describe the production process steps and positions. It will show incoming inspection through delivery of finished product and will identify all transportation activities.
All control points will be mapped and outsourced/subcontracted processes will be identified.

Traceability

The supplier will document how all parts are traced to a specific production run or a specific batch. (Depending on how the requirements are defined).

Tools labelling / Owner

All tools/fixtures that are Kalmar property must be tagged with a Kalmar asset plate, including information about part number, fixture/tool number and manufacturing date.

Test equipment

In case Kalmar is the owner of any test equipment or tool, it should be accompanied by a time schedule and information regarding design, capability, and true size.
An additional review of the equipment is also required, to verify that it complies with the specification.

5.3 QAP Gate 3 (Execution - Sample and documentation review)

The execution phase is where the supplier establishes and updates documentation reflecting the process and its capability. In addition, it is another progress review of documentation that requested activities are carried out as committed in Phase 1.

The execution phase is when the PPAP documentation and initial samples are submitted to Kalmar for final review and approval. Before submitting documentation and initial samples the supplier has the full responsibility to assure compliance to requirements, e.g. guarantee that documentation and sample fulfils the agreed requirements set in phase 1.
If deviations from requirements are found during inspection of documentation and samples at Kalmar premises, Kalmar has the right to invoice the cost connected to the non-conformity.

Process FMEA

The Process Failure Mode and Effects Analysis is a risk analysis which identifies and ranks the potential failure of the part's manufacturing process and is used to assure that risks are identified and mitigated with needed improvement actions to remove and/or to minimise the effects of a failure.

The P-FMEA shall be established using a cross functional team and approach and it is important that it is used as a living document and is continuously updated if issues in the process are identified.

Control Plan

The control plan shows how each specific process steps are controlled. It shall include all process steps, involved equipment, product and process characteristics to be measured, evaluation technique and method, possible sampling plans, out-of-control criteria, and out-of-control action should all be included.

Since the process flow chart, P-FMEA and control plan are connected, the control plan shall be established using a cross functional team and approach.

Process Instructions

With process instruction we mean specific instruction on how to carry out the work in detail at the defined process step. Instructions of the different process steps shall exist and be available close to the process and the operators will always know where they are to be found. They are to be clear and easy to follow and all operators shall have been trained according to the instructions.

Checking aids

Checking aids are defined as all tools, measuring equipment and fixtures that are in use in the process to assure conformance to the specification.
When a record of checking aid is established all of the above needs to be listed, with clear information on range of usage and tolerances.

Packing instructions

A copy of the packaging instruction for transport between Supplier and Kalmar might be requested. The instruction needs to be established so it will protect against possible damage during transport and so the handling at the receiving unit will be as easy and smooth as possible.
It is important to have in mind that the items may be delivered to different sites, and packaging methods may vary. In those cases we would expect copies of all packing instructions.

Process Audit

When all activities included in assuring that the process is ready for serial production are documented and finalised a process audit will be performed.
It will follow the process from its start until its end, confirming that all of the above activities described within the various phases are in place and well documented. It is performed to detect possible risks, bottlenecks, or problems that still remain in the process.
As a result of the process audit, an action plan will be agreed in order to remedy potential improvement areas.

Quality assurance of sub supplier

Kalmar has no general requirement that the supplier must follow the QAP process, but recommends that our suppliers have a similar approach to assure quality from their suppliers.
However we want to know that our suppliers are actively assuring their supplier's QDC performance and how it is being done.

Initial samples

Initial samples are requested to verify supplier capability to meet the requirements.
It is important that the initial samples are produced according to the planned serial production conditions. E.g. all tools, jigs and fixtures should be ready and approved, and shall be used in the production of the samples.

When submitting the initial samples to Kalmar the minimum requirement is to always include the measuring report along with the samples. If the measuring report is missing it is considered and handled as a non-conformance as not all specified requirements are fulfilled and delivered.

The measuring report must reflect the actual samples (all attributes specified) and a connection between physical part and measuring report should exist, e.g. connected numbering on part and report.

5.4 QAP Gate 4 (Approval - Release for serial production)

The Approval phase is where Kalmar, based on fulfilment of specified requirements, approves the initial samples and documentation requested in the specific QAP and gives clearance to start serial production.
Depending on the complexity and criticality of the project, the supplier and Kalmar might meet in a joint “lesson learn” meeting to review what has worked well, what didn’t work well and what could be improved for the next project. This activity will be done in the spirit of continuous improvement.

5.5 Activity and Documentation Requirements

To bring further light onto what is expected for each level of QAP in terms of quality assurance activities there is a guideline included in QAP Appendix 5

6. Inspection & Test Plan - ITP

Valid only for suppliers of small volume project specific business (components or subassemblies not identified as serial production parts)

Each ITP is set up with the supplier in a Kick-off meeting and contains a number of activities, control points and approval phases during the project.
Kalmar will follow up, review, inspect and give approval acknowledging that the supplier has fulfilled all specified requirements and is allowed to continue manufacturing.

6.1 Preparation

ITP plan review and activities are set up in the plan pre-launch of production activities. Preparation activities include review of relevant welding and inspection standards, material conformity and traceability, welding specification, welding consumables, qualification of welders/welding operators and NDT inspectors.

6.2 Fabrication

During the fabrication of steel structures a review is conducted to verify efficiency of material traceability, welding traceability and quality of thermal cutting, laminations and welding preparation.

6.3 Inspection

Review efficiency of visual welding inspections (completeness, joint appearance),verify the shape, dimensions and the tolerances of the structure after welding and machining, inspect defined welds with NDT and document/report inspections (List NDT inspectors and NDT reports). Measure required dimensions and report inspection.

6.4 Preservation

The preservation includes all necessary actions to verify process conditions, quality requirements and personnel skills relating with surface treatment activities such as: Approval for painting; working conditions (temperature, humidity etc.), blasting (verify that the result of blasting fulfils the requirements), inspect visually the quality of painting and measure the DFT and report inspections for: pre-painting and priming coat, pre-painting for intermediate coat and intermediate coat and pre-painting for top coat.

6.5 Documentation

Submittal of complete documents shall be sent with process documentation.
Kalmar verifies and stores the submitted documents. The ITP plan is an integrated part of the manufacturing process and must be completed within a given time frame.

7. Managing Performance

7.1 Key performance indicators (KPI)

Quality (Q)

Zero defects is a culture and mind-set within Kalmar where the target is always to establish standardised processes through our value streams to guarantee conformity to the specifications required.
We expect all of our suppliers to honour, support, and act according to the zero defect philosophy.
A zero defects approach gives us assurance that our supplies understand what is important to guarantee compliance to the specifications.

Today we are using PPM (Parts Per Million), and number of disturbances to measure and rank the performance of our suppliers. Calculations of PPM are made based on the statistics retrieved from our claim system.

$$\text{PPM (monthly)} = \frac{\text{Number of delivered non-conforming parts}}{\text{Total number delivered parts}} \times 1\,000\,0000$$

We expect our suppliers to be self-driven and proactive in continuously striving towards zero defects.

7.2 Monitor Performance

All suppliers are on a minimum of monthly basis being monitored on both local Kalmar site level, as well as, an overall Kalmar group level. Performance data is gathered, analysed and acted upon by dedicated resources.

Examples of metrics followed as a basis for decisions are:

- Number of Disturbances
- PPM Levels
- Claim Status (Supplier's responsiveness to claims)
- Top Quality Disturbances
- Escalated suppliers
- Outstanding payment for claims

Our Supplier Relationship Management teams are further analysing and taking actions based on the performance and trends.

7.3 Communication of Performance

Claim handling system

Is a portal in which Kalmar creates and communicates claims results to all suppliers.
The suppliers are obligated to reply through the claim system on all claims. To gain access, contact your local sourcing representative or Plant Quality representative.

Business Review Meeting

We are managing our preferred suppliers through supplier relationship management teams and business review meetings are performed with preferred suppliers on a quarterly basis.

During the business review meetings we review the performance and cooperation. We build a mutually beneficial communication and cooperation atmosphere and expect our suppliers to be open and honest in sharing issues, concerns and new ideas with an innovative mindset.

Monthly Quality Meetings

In prioritised cases we may also run monthly quality meetings to review performance and to align continuous improvement plans and other initiatives.

7.4 Acting on Deviations

Claiming

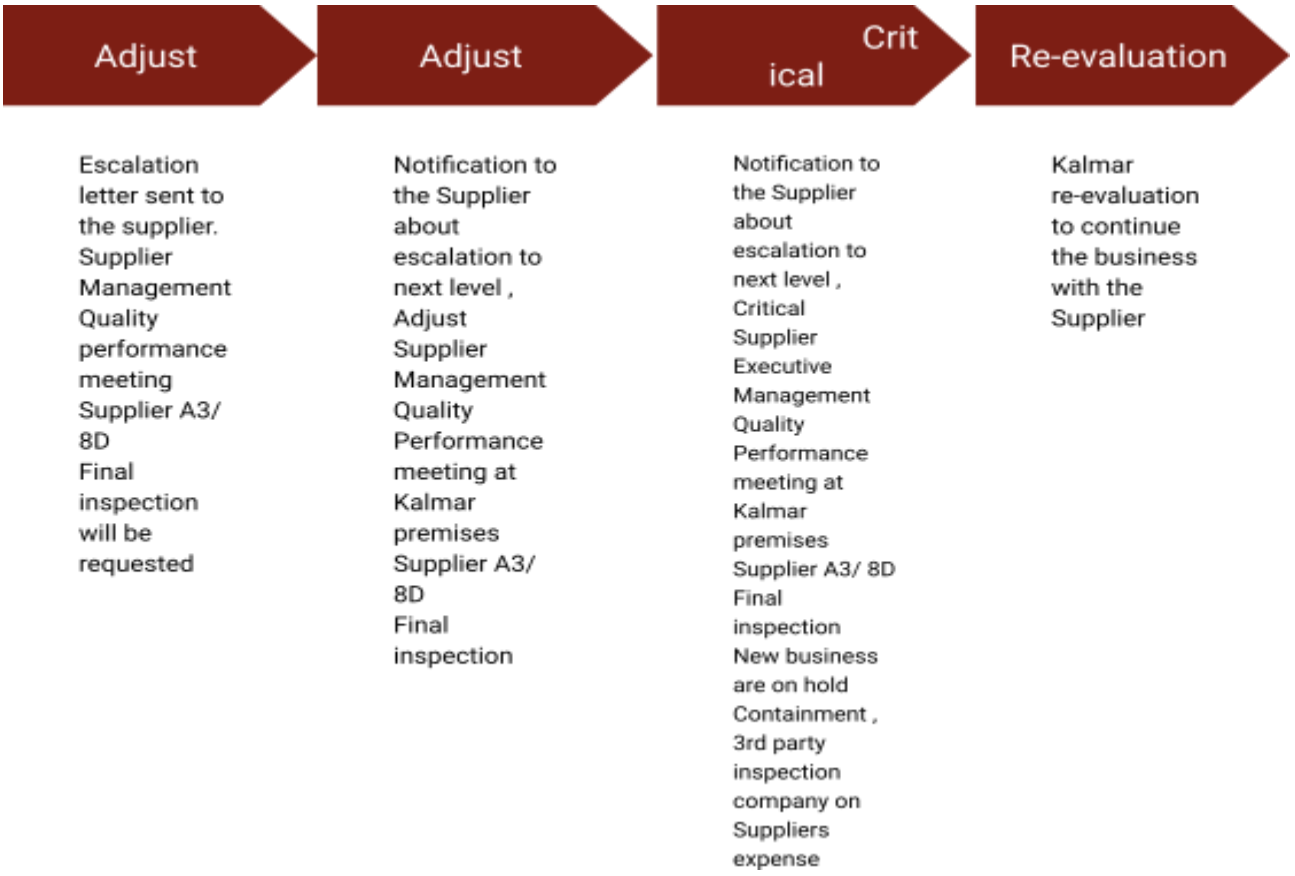
Claims to suppliers are being created through the claim system and suppliers are being notified through email. All suppliers are required to answer all claims with containment, corrective, and preventive actions, using the 8D structure in the claim or CAPA.

Containment, Corrective and Preventive Actions for Claims

- Containment: When a quality problem occurs Kalmar's standard requirement is that the supplier will perform containment activities internally and when necessary, arrange the review of the inventory at the affected Kalmar location within no more than 2 working days.
- Corrective actions are always requested and the supplier must revert with answers in no more than 5 working days.
- Preventive actions are always requested and the supplier must revert with answers in no more than 10 working days.
- Permanent actions must be implemented and verified within 20 working days, if no other time-frame is agreed.

Poor Performing Suppliers

If a supplier's performance is poor, Kalmar has a common process to manage and support the supplier to improve their performance back to acceptable levels.
The Escalation model, a supplier development ladder, consists of four steps: Adjust, Alert ,Critical and Re-evaluation.



Escalation Model in Brief

- The escalation will be implemented and managed through the monitoring of defined performance parameters.
- When measurement parameters indicate the beginning of a negative trend or a significant abnormality, the supplier is considered for elevation into the escalation ladder.
- Supplier improvement activities must be initiated and managed following the four steps in the escalation model.
- Each step has different activities and enter/exit criteria is to be set and reviewed to establish a basis for monitoring measurable performance.
- If the supplier does not meet the exit criteria by the completion date or if the situation becomes worse, the supplier will be elevated to the next step in the ladder.
- When the exit criterion is met the supplier will be moved back to the no action required monitoring step.
- The supplier may be put on escalation on either individual part numbers or on a multiple part numbers basis.
- The supplier will be continuously tracked and monitored during escalation on a global Kalmar group level.
- If Lack of commitment and improvement activities the Supplier will be put on New Business on Hold and re-evaluate the business cooperation.

Audits

Kalmar uses different kinds of audits, but the most common is the process audits which are used to verify whether the supplier process is capable and what process improvement areas the supplier may have.

7.5 Cost of Poor Quality

All costs caused by imperfection in specifications, systems, processes, procedures as well as in workmanship add cost and reduce the profitability for both Kalmar and the supplier.

We are constantly striving towards zero defects and on-time deliveries through standard work and continuous improvement and part of that is fine-tuning the specifications, as well as, addressing imperfections in our systems, processes and procedures to reduce waste and minimise variations.

As a supplier to Kalmar, you are asked to continuously improve your way of working within the complete value-chain and to assure that failures are not occurring or leaving your premises. You are asked to work with your systems, processes and procedures to minimise any impact to Kalmar and to keep the cost of poor quality at an absolute minimum.

Any cost that may be referred to as imperfections delivered by you as a supplier will be topic for recovery discussions in accordance with valid agreements.

7.6 Kalmar Business Systems and Continuous Improvements

The way Kalmar works is a reflection of the Kalmar Production Systems and is an extension of the beliefs and a philosophy of lean and continuous improvement that can be used across all aspects of a business. It is not a project, but rather a way of living. It is a culture, an attitude and a mind-set.
The way of working is based on standards and aims to constantly add value for customers while eliminating all forms of waste with participation by all employees. Only through the responsible participation of all employees will it be possible to deliver continuous improvements and move towards zero defects.

Continuous improvement means to strive to make ongoing improvements (reduce waste) in work processes on a daily basis, by implementing new and innovative solutions, using disciplined problem-solving processes, and implementing and sharing best practices.
Initially one must identify a starting point from which we can continuously improve - without a standard there can be no improvement.

As our supplier we expect that you work to understand what creates value for Kalmar and are constantly looking for improvements to your processes while minimising non-value-added activities (waste). We urge our suppliers to put focus on optimising the

flow of parts and components through all of your processes (value streams), from your suppliers to us as your customers. You are expected to be innovative and committed to having a continuous improvement culture that challenges the status quo.

8. Change Management

8.1 Change of Process & Change request for Part or Component

Before the suppliers are allowed to perform any changes, information about the reason and request for approval must be sent to Kalmar in advance. Then Kalmar will determine if, how, and when the change can be executed.

Examples of changes that require approval prior to implementation are:

- Change in a process *(manufacturing method)*
- Change of a component
- Change of material

Suppliers shall use the Engineering & Change Request template, which can be obtained by contacting your sourcing, supplier development or quality contacts.

8.2 Deviation / Interim Approval for Part or Component

We always expect and take for granted that our suppliers are fully compliant with the requirements stated, but in cases where full compliance is not possible we have routines that must be followed.

In the case that compliance to certain specifications or other requirements is not possible we utilise an interim or deviation approval. The biggest difference between them is that an interim approval is used in pre-production (before parts are approved for serial production by Kalmar or when processes are not ready for “serial condition”), while deviation approvals are used for deviations in running production (parts and processes already approved for serial deliveries).

Approval of deviations in technical specification can only be granted by Kalmar R&D, while process deviations may be approved by Kalmar Supplier Development.
Both interim and deviation approval is for a limited amount of time (deviation may also be limited based on quantity), and as soon as any of those limits expires, the supplier is no longer allowed to deliver anything else than parts which are fully compliant with our specifications and produced under serial conditions.

It is the supplier's responsibility to notify Kalmar in advance and ask for interim or deviation approval. If no approval is given, the supplier is not allowed to deliver anything other than parts fully compliant with our specifications and produced under serial conditions.

Request for interim or deviation approval shall always be done on templates that will be provided to you, upon request, by your sourcing, supplier development or quality contact.

9. Supplier Relationship

As highlighted, we are not going to achieve the full potential in creating customer value if we do not closely align ourselves and increase cooperation across the total supply chain. We are committed to work very closely with our key suppliers.

In this document we have highlighted the expectations that we have of our suppliers, but it is equally important to understand where we as a customer can bring additional value to you as our supplier. Below are a few areas to be highlighted as keys to success.

9.1 Support

We are expecting our suppliers to give their support and bring ideas and innovation into the products and our preferred suppliers should expect us to give support in all areas from overall further development to joint problem solving and issue resolution. To facilitate most of this support we have highly dedicated Supplier Relationship Management teams.

Some examples of where our preferred suppliers can expect support:

- Development of actions to further improve the supplier
- Process productivity improvements
- Planning for quality and further clarifications of expectations and requirements
- Technical discussion with Kalmar R&D or site quality
- Discussion around actual or potential issues
- Solving complex quality issues, whether it is affecting a Kalmar site or a Kalmar customer

9.2 Training

Kalmar is committed to train our preferred suppliers in areas connected to our expectations, requirements and the way we do business.

If there is a training need, please contact your sourcing or supplier development representative for further discussion.

10. Templates

All templates referred to in this document can be obtained by request from your Sourcing or Supplier Development representative.

Appendix 1: Definitions and Acronyms

8D	A Problem Solving Process to identify, correct and eliminate the recurrence of quality problems.
Kalmar Supplier Requirements	A set of Kalmar mandatory requirements that a supplier needs to comply with in order to be rewarded business.
Claim	A report of non-conformance that is filed in the Kalmar claim system and submitted to suppliers for corrective and preventive actions.
Containment	An activity to contain the problem at its root with all necessary means.
Control Plan	A detailed document (plan) linking manufacturing process steps to key inspection and control activities. It should list all product and process inspection points required to deliver a defect free outcome, and is essential for maintaining process control over time.
COPQ	Cost of poor quality (COPQ) is costs that would disappear if systems, processes, and products were perfect.
Corrective Action	Reactive improvements to processes taken to eliminate causes of non-conformities, utilising root cause analyses.
Deviation Approval	A temporary deviation, by time or number of components that without compromising critical functions or dimensions, allows the supplier to deliver outside specification.
DFMEA	Design FMEA, see FMEA.
DFT	Dry film thickness.
ECR	An engineering change request (ECR), a request for a change in product or process and is used to describe a suggested enhancement or problem with a product.
Firewall CS (Containment)	An additional activity to stop nonconforming parts at its root with all necessary actions taken to eliminate any nonconforming parts to be shipped to Kalmar. Controlled shipments. There are two levels of controlled shipments: Level 1 controls are carried by the supplier and their own resources before Shipment to Kalmar to assure all parts are conforming to specifications and requirements.. Level 2 , 100% control is carried out through an external company which the supplier is responsible to hire and pay for.
FMEA	Failure Mode and Effects Analysis is a systematic technique for failure analysis. It involves reviewing as many components, assemblies, and subsystems as possible to identify failure modes, and their causes and effects. For each family/type of products or/and processes, the failure modes and their resulting effects on the rest of the system are recorded in a specific FMEA worksheet.
Enter Criteria	The reason for entering or elevating in the escalation model.

Exit Criteria	The criteria must be fulfilled in order to be released from escalation.
Interim Approval	A temporary approval during QAP for a period of time that would allow for deliveries even if not all requirements are yet fully fulfilled.
ISO	International Organization for Standardization.
ITP	Inspection and Test Plan.
KPI	Key Performance indicators are quantifiable measures used to gauge, compare and act upon a supplier's performance.
NDT	Non Destructive Testing.
Non Value Add	Activities that do not contribute to add value for the customer.
PFMEA	Process FMEA, see FMEA.
PPAP	Production Part Approval Process, Part of the QAP.
PPM	Defective Parts per Million is the value defined as the number of defective parts per 1.000.000 parts delivered.
Preventive Action	Proactive activities oriented towards a potential problem in the future. They improve a process or a product to prevent a problem from occurring.
Procedure	An instruction that shows how to prepare or make something, to achieve a desired result. Should be designed to describe Who, What, Where, When and Why .
Process	A series of activities required to produce a specific product or service.
PSW	Part submission warrant is the form where supplier warrants that they meet all Kalmar requirements related to the component in question.
QAP	Quality Assurance Plan (QAP) is a structured plan for preparing supplier processes for serial production. The QAP is to be used to define and establish necessary steps to assure that the product fulfils specified requirements.
RFQ	Request For Quotation (RFQ) is a process whose purpose is to invite suppliers into a bidding process for a specific product or services.
RTS	Review Technical Specification is the activities required to ensure that all specifications and standards are received, properly understood and can be fulfilled.
SOP	Start Of Production (SOP) is the date when serial production is planned to start.
Standard Work	Agreed and documented ways of working, performing a task or activity. The "one best way" (the standard), to perform a task, that delivers efficient, repeatable and predictable work results every time.
Supplier Relationship Management	The coordination of all interactions with suppliers in order to maximise the value of the interactions, to create closer, more collaborative relationships with key suppliers in order to uncover and realise new value and reduce risk.
Value Add	Activities that transform a product in a way that the Customer is willing to pay for. It needs to meet the following criteria: 1) The customer is willing to pay for the activity, 2) It must be done right the first time, 3) The action must change the product in some manner.
Waste	Waste that is anything other than the absolute minimum of equipment, methods, materials, effort and management that are necessary to add value.
Zero Defects	Zero Defects is a management tool aimed at the reduction of defects through prevention. It is about motivating people to prevent mistakes by doing their job right the first time.

Appendix 2: QAP – Activity and Documentation Requirements

Phase	Activity	Level A	Level B	Level C
Phase 1	Customer specifications (Drawings & Standards etc).	x	x	
	Review of technical specifications	x	x	
	PPAP Schedule	x	x	x
	Risk analysis	x		
	Supplier feasibility commitment	x	x	x
	Gate approval	x		
Phase 2	SOP plan (start of production plan)	x		
	Process flowchart	x		
	Traceability	x		
	Tools labelling / Owner	x		
	Test equipment	x		
Phase 3	Process FMEA	x	x	
	Control plan	x	x	
	Process instructions	x	x	
	Checking aids	x		
	Packing instructions	x		
	Process audit	x		
	Quality assurance of sub supplier	x		
	Initial samples	x	x	x
Phase 4	Customer approval (PPAP)	x	x	x
	Lessons learned	x		

QAP Table 1. Activities for different level of QAP depending on part & supplier criticality

	Requirements	Submission level		
		A	B	C
1	**Design Records**	S	S	*
2	**Engineering Change Documents, if any**	*	*	*
3	**Customer Engineering Approval, if required**	*	*	*
4	***Design FMEA***	*	*	*
5	**Process Flow Diagrams**	S	*	*
6	**Process FMEA**	S	R	*
7	**Control Plan**	S	S	*
8	**Dimensional Results**	S	S	S
9	**Material and Performance Test Results**	S	S	*
10	**Initial sample**	S	S	S
11	***Checking Aids***	S	*	*
12	**Packaging Instructions**	S	S	*
13	**Part Submission Warrant**	S	S	S

QAP Table 2. PPAP Documentation requirements

S = The supplier shall submit to Kalmar and retain a copy at appropriate locations.
R = The supplier shall retain at appropriate locations and make available to Kalmar upon request
* = The supplier shall retain at appropriate location and be able to submit to Kalmar upon request