



ROSATOM

Turbine Technology

AAEM

STATE ATOMIC ENERGY CORPORATION ROSATOM

Ensuring the supply of equipment for the turbine island

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Quality Manager

Nuclear Industry Supplier Forum, Cairo

08th of October, 2019

Turbine Technology AAEM LLC Joint-Venture, established in 2007

2007

Half-speed turbine technology is a definitive choice made by the nuclear industry worldwide

100% steam turbines worldwide rated at 1200 MW and above are half-speed

No reference half-speed technology available in Russia

AAEM LLC, a joint-venture between Atomenergomash (51%) and Alstom (49%) **holding a license to the Arabelle™ half-speed technology, established**

2015

General electric (GE) closed a deal to acquire Alstom's power business

GEAST, a GE (80%) and Alstom (20%) joint venture established (with one gold share held by the french government)

2016

Ownership of the **49% share in JV AAEM** transferred to GEAST



AAEM Company profile



- Manufacture of ARABELLE™ steam turbines, generators, heat-exchange equipment and auxiliary equipment for Nuclear Machine Halls ranged 1000–1800 MW
- Delivery of the Nuclear Machine Hall Equipment with ARABELLE™ Steam Turbine behind VVER Reactor Technology
- Nuclear Turbine Hall Equipment Retrofit
- Service of Nuclear Machine Hall Equipment

Ongoing projects:

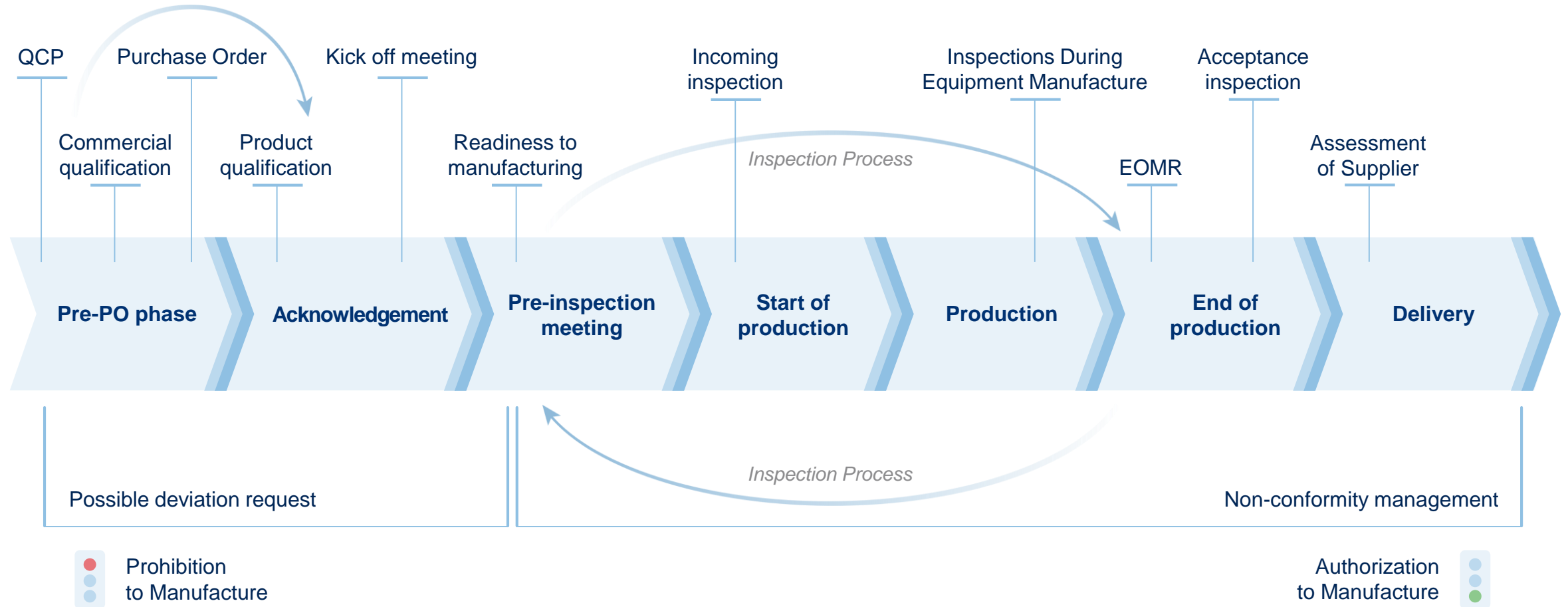
Akkuyu NPP,
1-4, Turkey

El-Dabaa
NPP, 1-4,
Egypt

Hanhikivi-1
NPP, Finland

Paks NPP,
5&6, Hungary

Supplier quality management



Quality Control Plan (QCP)



Quality Control Plan (QCP) defines the minimum requirements relevant to the manufacture of a particular equipment.

QCPs are developed for equipment based on experience of GEAPS.

QCP is part of each request for quotation sent to a subsupplier.

Example of QCP

AAEM		Revision: Doc. Language Page: Type: en 3/7								
		QUALITY CONTROL PLAN								
		NPP AKKUYU								
		CONTINUOUS TUBE CLEANING EQUIPMENT								
REV.	OPERATION No.	COMPONENTS								
		Strainer assembly	Strainer casing	Screens	Ball collector	Ball distributor	Valves	Electrical actuators	Pumps	LV motors
WORKSHOP CONTROL OPERATIONS										
A	Materials									
a1	Chemical composition	1	1		1	1	1		1	
a2	Mechanical characteristics	1	1		1	1	1		1	
a3	Heat treatments	1								
a4	Electrodes and filler metals	1								
a5	Hardness test									
B	Qualifications									
b1	Welders and operators	1			1	1				
b2	Welding procedures	1			1	1				
b3	Tube expanding									
b4	Tube bending									
b5	NDT personnel	1			1	1				
C	Non-destructive tests									
c1	Liquid penetrant test	1			1	1				
c2	Magnetic particle test	1			1	1				
c3	Eddy current test									
c4	Radiographic test	1								
c5	Ultrasonic test	1								
c6	Visual-Dimensional check	2								
c7	Surface protection (painting...)									
D	Destructive tests									
d1	Welding production sample									
d2	Expanding production sample									
E	Pressure tests									
e1	Hydrostatic pressure test	2			1	1	1		1	
e2	Air pressure test									
e3	Vacuum leak test									
F	Manufacturing									
f1	Balancing test								1	
f2	Functioning test	2								
f3	Performance test							1	1	1
f4	Noise level									
f5	Vibration level									
G	Conformity									
g1	Final Conformity Inspection (FCI)									
g2	Pre-shipment Inspection (PSI)									

QCP contains:

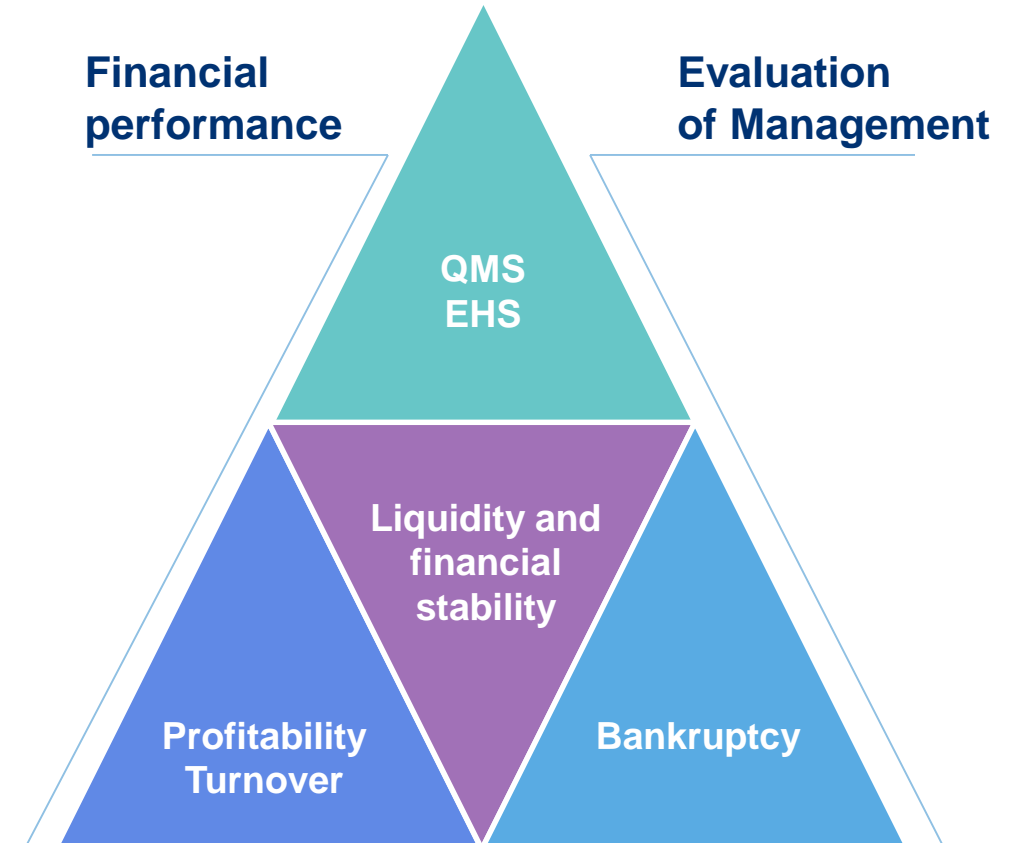
1. Workshop control operations for equipment and components,
2. Activity of participants of inspections,
3. Requirements to:
 - materials
 - qualifications of personnel
 - manufacturing
 - control operations

Qualification of subsuppliers

1st step - Commercial Supplier Qualification

Questionnaires to potential subsuppliers consist of information regarding:

1. Company
2. Organization
3. Commercial Aspects
4. Production Site and Capabilities
5. Engineering / Research & Development – Capabilities
6. Logistics
7. Quality and Environmental, Health and Safety Management Systems
8. Social aspects & policy



Qualification of subsuppliers

2nd step - Product Qualification processes

Commercial qualification results



Level 1 –
approved



Level 2 –
approved with conditions



Level 3 –
not approved

Deviations shall be eliminated within a reasonable time agreed with the AAEM

Product Qualification

1. Specific requirements to equipment
2. Audit of production
3. FMEA Failure Mode And Effect Analysis

Pre-approved Supplier

Pre-approved Supplier with conditions

 **Not approved**

1st condition

Deviations shall be eliminated



Readiness to manufacturing

Kick meeting

21.	Clarification of interfaces The following person will be the responsible person for the El-Dabaa schedule: - DEZ: M. Filimonov - AAEM: M. Sokolin / M. Feonofov - APS: Ms Melanie Emily		
22.	Monthly progress form – Appendix 11 Format: APS has proposed to AAEM a form which shall be further be forwarded to ASE and DEZ. DEZ is open for discussion. AAEM will formalize an official request to DEZ. Cut-off date: APS proposes to have a cut-off date on the 20 th of each month. DEZ is open for discussion. AAEM will formalize an official request to ASE/DEZ.	AAEM (SM)	12/10
		AAEM (SM)	12/10
23.	Long Lead Item: APS informs all project stakeholders that as foreseen in Appendix 43 of the Contract, the first documents of LLI components will be issued in December 2018. APS highlight that this process is critical for APS since some of LLI PO need to be placed urgently. APS introduces typical document of Quality Inspection & Test Plan, Technical specification and Material specification. This documents will be transferred to AAEM and then to DEZ (by AAEM). The first documents for LLI are expected to be transmitted in December 2018. In addition APS will send the time schedule of PO placement for LLI. Since Contract signature was delayed and Date of Delivery remained however unchanged, some additional components become now critical. In order to solve the issue, 2 options are possible: - Amend the list of LLI in the Appendix 43 - Speed-up submission and approval of TOR for those new critical components. The parties have a common understanding that the first TOR approval date (generator) shall be advanced by 6 months compared to original contract date. Due to the risk of TOR approval slippage and consequent impact on delivery date of equipment, APS insists that a plan B should be set-up in order to have the list of Appendix 43 amended. APS will send an official letter to AAEM.	APS	20/10/2018
		APS	25/12/2018
		APS	15/10/2018
24.	F/ ENGINEERING		
25.	ASE Introduction ASE introduces meeting mentioning an additional item from agenda to be discussed : engineering documents dates of delivery to be		

1. Discussion of special requirements of Contract
 - Safety Classification / Quality Requirements
 - Quality Management System (QMS)
 - Quality Assurance Program (QAP)
 - Quality Plans
 - Non Conformance Template and Reporting
 - Notification of Inspection
 - Codes & Standards
 - End of Manufacturing Report (EOMR)
2. Identification of gaps and responsible persons in the areas of work
3. Contract clarifications
4. Action plan development and sign



Execution of Contract

Quality assurance program (QAP)


QAP describes connections of all processes of the organization, aimed at quality assurance (can be common in the organization or private in the areas of activity, QAP - on the design, manufacture, etc.)


Start of manufacturing of the Products is possible only after the QAP has been duly agreed on and approved

Audit of QAP conducts annually

Not required for subsuppliers of QNC equipment (in this case ISO 9001 certificate and quality manual is required)





AAEM «Turbine Technology AAEM»
 Limited Liability Company (AAEM LLC)

AGREED BY:

Makhymov A.G.
21.02.2019

APPROVED BY:

S.S. Miropolskiy
[El-Dabaa NPP Project Director]
18/02, 2019

QUALITY ASSURANCE PROGRAM
for the supply of equipment for El-Dabaa NPP Units 1, 2, 3, 4

Document Number:
 QAP 9.04-2018
 ED.S.0000.&.00MA&&&&&&&&&.089.QF.0001.E
 Rev. 1.0 **PAGE 1 OF 87**

PREPARED BY Quality Manager		CHECKED BY Quality and Safety Culture Director	
Alexander A. Podkatilov		Dmitry E. Korotkov	
Signature 	Date [18.02.2019]	Signature 	Date [18.02.2019]
Translated by Valery I. Berезovsky 		Translation checked by Vladislav S. Maltsev 	
Safety related: <input type="checkbox"/> Yes	Quality related: <input checked="" type="checkbox"/> Yes	Confidentiality: <input type="checkbox"/> Yes	Restricted right of use: <input type="checkbox"/> Yes
Other: <input type="checkbox"/> Yes		Internal / project use: <input checked="" type="checkbox"/> Yes	
File name: ED.S.0000.&.00MA&&&&&&&.089.QF.0001.E AAEM_SUPPLIER_QAP_9.04-2018.docx		Master copy No.	Permanent: <input checked="" type="checkbox"/> Yes Temporary: <input type="checkbox"/> Yes
Document issued to replace: NA		Issued for: <input type="checkbox"/> Review <input checked="" type="checkbox"/> Approval <input type="checkbox"/> Information <input type="checkbox"/> Use	

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Quality plans – QP

Inspection and test plan – ITPI



Example of ITPI

ПАО «ЗиО-Подольск» <i>PJSC «ZiO-Podolsk»</i>		ПЛАН ИНСПЕКЦИЙ И ИСПЫТАНИЙ <i>INSPECTION AND TEST PLAN</i>		Рег.№АЭС АККУЮ, ПИИ -3иО-001-2019 Reg. No. NPP AKKUYU-ITP -ZiO-001-2019		Ред. 0 Rev. 0		Лист 2 из 13 Sheet 2 of 13		
№ д/п <i>Slr. No.</i>	Наименование контрольной точки <i>Name Inspection Step</i>	Наименование оборудования, деталей, узлов <i>Name of Equipment Parts of assemblies</i>	РКД, ТД, НД, содержащие требования к качеству/ <i>WDD, TD, TB with quality requirements</i>	Содержание действий <i>Content of actions</i>	Документы регистрации результатов <i>Documents of recording results</i>	Статус контрольных точек и свидетельство соответствия <i>Status of control points and conformity certificate</i>				Примечание <i>Note</i>
						ПАО «ЗиО-Подольск»/ <i>PJSC «ZiO-Podolsk»</i>		ООО «ААЭМ» / <i>«AAEM» LLC</i>		
						Тип точки <i>Point Type</i>	Подпись <i>Signature</i> Джамалбеке	Тип точки <i>Point Type</i>	Подпись <i>Signature</i> Джамалбеке	
1	2	3	4	5	6	7	8	9	10	11
1	Готовность производства предприятия-изготовителя перед началом изготовления продукции <i>Readiness of the manufacturer's production before beginning of the products' manufacturing (Pre-inspection meeting)</i>	Фундаментные и подкладные плиты конденсатора АЭС «Аккую» <i>Foundation and back-up plates of condenser at NPP Аккую</i>	EN 1090-2 95.3757.904Д1 95.3757.905Д1 Спецификация / <i>Specification</i> 95.3757.900	Проверка готовности предприятия <i>Inspection of company's readiness</i>	Акт проверки готовности производства предприятия-изготовителя перед началом изготовления; Заключение о контроле качества; <i>Manufacturer inspection report on production readiness before manufacturing start; Conclusion on quality control</i>	НР		НР		

Readiness to manufacturing



It is first control point of each QP/ITPI, where the readiness for the manufacturing of equipment is estimated.

It is «HP» (hold point) control point for all participants of conformity assessment

At this stage will be checked (at least):

- Licenses, certificates, permits and approvals
- Agreed design and manufacturing documentation for the equipment
- Availability of necessary Calculations/expertise
- Personnel and process qualifications
- Compliance of production with the Quality Assurance Program (QAP)

Inspections During Equipment Manufacture

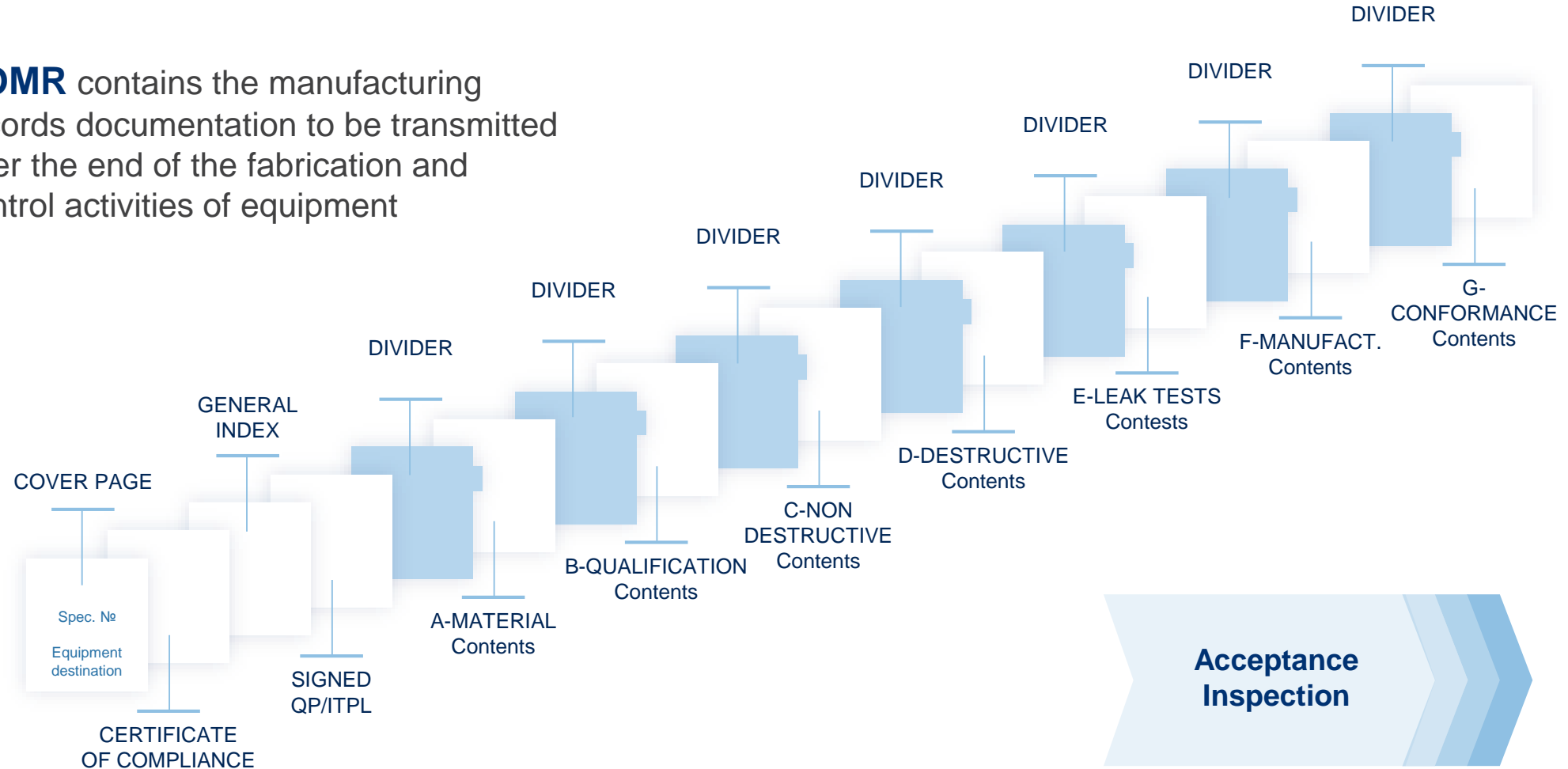
Status of control point in QP depends on QA categories of Equipment and could be:



 * all control points of the manufacturer should be «HP»

End of manufacturing report - EOMR

EOMR contains the manufacturing records documentation to be transmitted after the end of the fabrication and control activities of equipment



Acceptance inspection

Acceptance Inspection is the last control point of the QP

It is «HP» (hold point) control point for all participants of conformity assessment

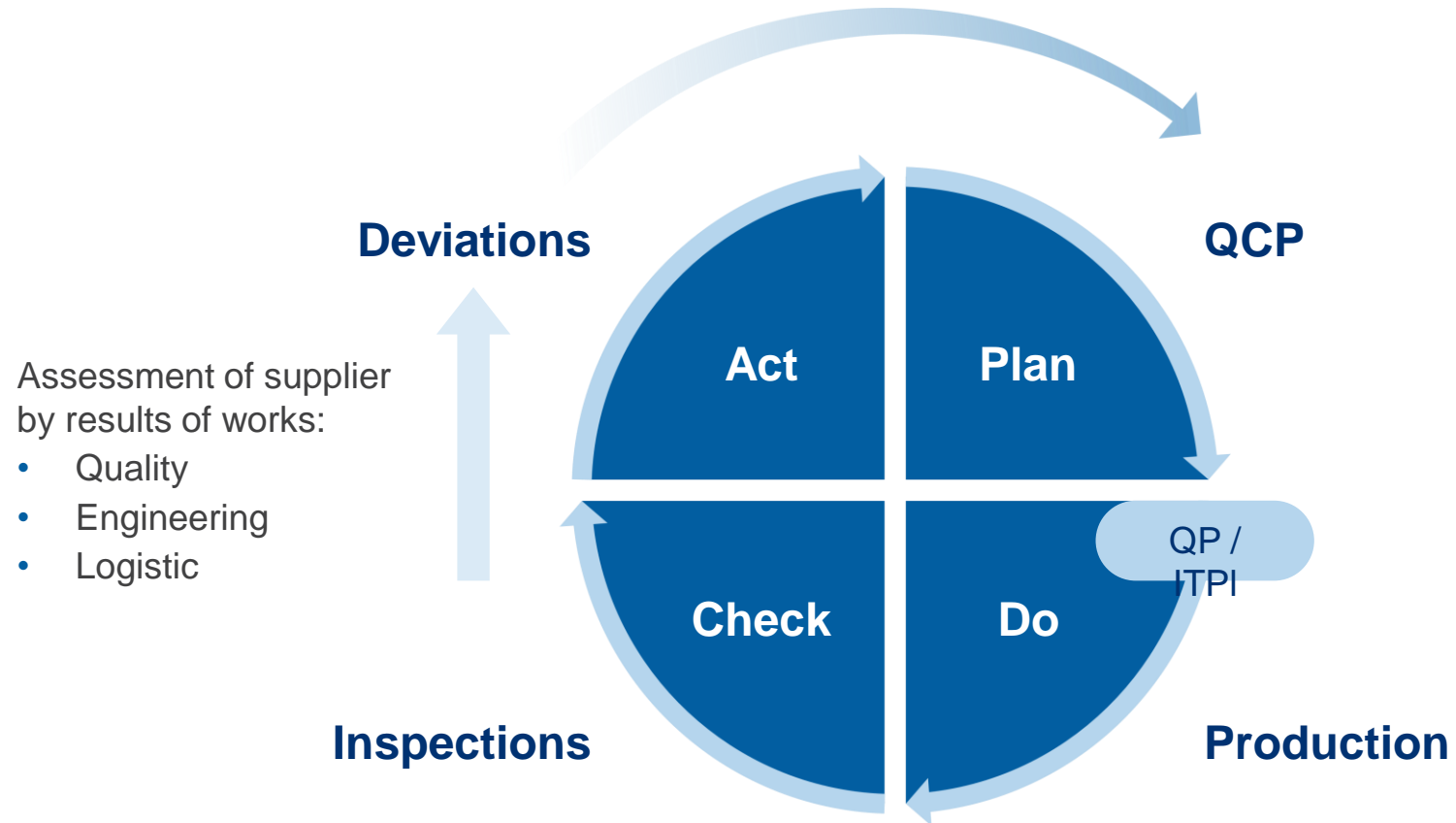
For QNC Equipment is the only point of conformity assessment by representatives of all participants of conformity assessment

Presented products that have passed the necessary checks and tests and accepted the manufacturer's quality control department

After successful acceptance inspection issued a **Certificate of acceptance inspection**



Assessment of Supplier





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AAEM

Thank you for attention!

Best regards,
LLC AAEM