

SAP QM Overview for ABAP Developers



Applies to:

SAP R/3 4.6C and higher release. For more information, visit the [ABAP homepage](#).

Summary

This article provides a brief overview of the functionality provided by SAP in QM module. Its objective is to help the ABAP developers to understand the requirements from functionality and technical perspective.

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Author Bio

I have been working on SAP R/3 since last 4.5 yrs in Infosys Technologies Ltd. During this course I have came across many modules like MM, SD, FI/CO, PP/PM etc. Since the last year I have been involved in SAP QM implementation project as a technical lead which inspired me to prepare this document to help the developers to understand the QM module.

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Overview

The purpose of this document is to make the ABAP developers familiar to the basic concept of SAP QM module and the objects that they usually come across during development in any SAP QM implementation or support project.

What is SAP QM

SAP QM is the Quality Module of SAP which ensures all the elements of a quality management system as specified in ISO 9000.

The module is closely integrated with Materials Management (MM), Sales and Distribution (SD), and Production Planning (PP).

Technical Objects Involved in SAP QM

In this section we will discuss various objects involved in SAP QM from developer's perspective

Inspection Lot

The system uses the inspection lot to record, process, and manage information for a quality Inspection.

In simple terms, an Insp. Lot is defined quantity of material on which the quality tests should be carried out so as to assure that the material is suitable for use.

Inspection Lot is created in following ways:

1. While doing GR using MIGO
2. While releasing a process order using transaction COR2.
3. While creating deliveries in SD using VL01n
4. While releasing maintenance order in IW32
5. Manually using transaction QA01
6. by a background job (report RQAAAS10) for recurring inspections

In MIGO, the lot quantity will be similar to GR quantity and when created from production order, the lot quantity is similar to the planned production quantity (field total quantity in the process order).

Once an inspection lot has been created, you can inspect the goods, record the inspection results or defects, and complete the inspection with a usage decision.

The master table for Insp. Lot is **QALS**.

Important fields:

PRUEFLOS	defines the Insp. Lot number which was created during MIGO or COR2.
MATNR	Material for which Insp. Lot was created. This comes from GR.
CHARG	Batch for which Insp. Lot was created. This number is created by system during GR.
AUFNR	This is the process order number for which lot was created
PLNTY	Task list type
PLNNR	Key for task list group
PLNAL	Group counter
AUFPL	Routing number for operations in the order

PLNTY/PLNNR/PLNAL together defines the inspection plan which is assigned to the inspection lot

QA01 – tcode to create Insp. Lot manually

QA02 – tcode to change Insp. Lot. Can be used for both manually and automatically created lots.

QA03 – tcode to display Insp. Lot.

Inspection Lot Completion

The usage decision for an inspection lot confirms that an inspection has been completed.

The UD is done only when all the characteristics for the inspection Lot are closed.

UD indicates end of Inspection.

- For each Inspection Type, the corresponding selected sets are defined in the Customizing.
- Each Code Group in turn can have multiple codes that can be used for UD.

QA11 - is the tcode for making UD

QA12 – is used to change UD.

QAVE is the table for Inspection lot UD.

Important fields:

PRUEFLOS	defines the Insp. Lot number which was created during MIGO or COR2.
VAUSWAHLMG	Selected Set of the Usage Decision
VCODE	Code Group of the Usage Decision
VAUSWAHLMG	Usage Decision Code
DBEWERTUNG	Code Valuation
VFOLGEAKTI	Follow-Up Action

The usage decision can also trigger automatic follow-up actions that means some steps can be carried out automatically as soon as the usage decision is done.

These follow-up actions are linked to the Usage decision codes. **TQ07** is the table to define this relation in SAP.

The follow-up actions can be triggered in form of function modules. **TQ07A** is used to display the list and sequence of function modules that are linked to a particular follow-up action.

Inspection Planning

Inspection Planning is used to define the inspection criteria. SAP R/3 uses task lists as a planning and processing tool.

Different task lists are used based on different application component in SAP.

In production (application component PP)

Routings

Rate routings

Reference operation sets

In the process industry (application component PP-PI)

Master recipes

In plant maintenance (application component PM)

Maintenance task lists

In quality management (application component QM)

Inspection plans

Reference operation sets

We will only discuss Inspection Plans in this section.

3.2.1 Inspection Plans

Inspection plans defines which tests need to be carried out on the Inspection lots during Quality Inspection.

Inspection Plans contains information with reference to operations and the work centers in which these operations are carried out.

Each operation then contains the list of characteristics which are used for recording the results, they are called Master Inspection Characteristics(MICs).

An operation can have one or multiple Inspection Points that describe the object to be inspected. In customizing 6 different user fields may be activated to identify an inspection point. Physical samples are a special type of inspection point.

Predefined field (dependent on insp. point type)		
	Field act.	Keyword
	<input type="checkbox"/>	

User fields		
	Field act.	Keyword
Text length 18	<input checked="" type="checkbox"/>	Identification
Text length 10	<input type="checkbox"/>	
Number length 10	<input type="checkbox"/>	
Number length 3	<input type="checkbox"/>	
Date	<input type="checkbox"/>	
Time	<input type="checkbox"/>	

Imp Transactions:

QP03 – Display Inspection Plan

Display Inspection Plan : Header Details

Task lists | Material assignment | Operations

Group: ZCHQ0034

Task list

Group: ZCHQ0034

Group counter: 1

Plant: CH28

test

Long text exists

General data

Deletion flag

Multiple Specs

Usage: 1

Status: 4

Planner group:

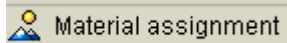
Planning work center:


CAPP order:

From lot size: 0,000

To lot size: 99,999,999,000

Old task list no.:



Material assignment  **Material assignment** allows to assign the Inspection plan to one or multiple materials. Its because of this assignment that the Inspection plans gets assigned to the Inspection Lots which are created for this material. The material assignments are stored in table **MAPL**.



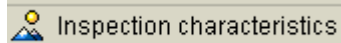
Operations allows you to display the operations which are defined in the Inspection Plan.


Inspection Plan Display: Operation Overview

Group ZCHQ0034 test Grp. ct. 1
Sequence 0

Operation overv.

Op	SOp	Work center	Plnt	Control key	Standard	Description	Lo	Cl	O	Pe	C	Su	Base quantity	U
0010		ZCH00001	CH28	ZQM3		CHEMICAL TESTING	<input type="checkbox"/>					<input type="checkbox"/>	1,000	K6



Select the operation and click  **Inspection characteristics**, this shows all the characteristics that are assigned to the operation

The header table for task list is **PLKO**.

Important Fields

PLNTY	Task list type
PLNNR	Key for task list group
PLNAL	Group counter

The link between Inspection plan to operation/Activity is define in **PLPO**

Important Fields

PLNTY	Task list type
PLNNR	Key for task list group
PLNAL	Group counter
VORNR	Operation Number
ARBID	Object ID of work centre

PLMK – gives the relation of Inspection Plan with Inspection characteristics.

Important Fields

PLNTY	Physical Sample Number
PLNNR	Key for task list group
PLNAL	Group counter
MERKNR	Inspection Characteristic Number as assigned to the operation
VERWMERKM	Master insp.charac. number
KURZTEXT	Short text insp.char

V_QAPO – gives the relation of Inspection Lot, Inspection Plan and Operation.

Important Fields

AUFPL	Routing number for operations in the order, this is maintained in QALS
VORGLFNR	General counter for order, this is the internal number for operation which is used in all result recording tables
PLNTY	Task list type
PLNNR	Key for task list group
PLNAL	Group counter
VORNR	Operation Number
ARBID	Object ID of work centre

Physical Samples

Samples are the portions of Insp. Lot on which quality tests are conducted. They are also called as Inspection Points.

An Inspection Lot can have multiple physical Samples

These samples are created automatically by system during Insp. Lot creation based on Sampling Procedure. The samples are grouped together in a sample drawing (table **QPRN**).

The master table for Physical Samples **QPRS**.

Important Fields

PHYNR	Physical Sample Number
OBJNR	Object number
STSMA	Status Profile for Physical Samples
PRART	Physical-Sample Type
PRTYP	Physical-Sample Category
PN_NR	Physical-Sample-Drawing Number
PLOS2	Current or Last Inspection Lot for the Sample
MATNR	Material number
WERKS	Plant
CHARG	Batch number
KTEXT	Short Text for Physical Sample
GEBEH	Lot Container
TPBIS	Highest Partial Sample No. Valid for Instruction

QPRS table can be appended with customer specific fields.

The relation between inspection points(sample number) and the operation from Insp. Plan to which they belong is defined in **QAPP**

Important Fields

PRUEFLOS	Insp. Lot number
VORGLFNR	Internal counter for Operation in Insp. Plan. Its relation with actual operation number is explained later
PPSORTKEY	Sort field for Insp. Point. (contains sample number or equipment number if Insp lot is for Plant Maintenance)
EQUNR	Equipment Number. This field is populated for Insp. Lots that are created for Plant Maintenance
PHYNR	Sample Number. This field is populated for QM Insp. Lots

Result Recording

This is a very important part of the entire QM process. Here we record and process results for Inspection Characteristics that are assigned to the Inspection Lot.

Result recording is done for each Inspection point (Physical Sample , Equipment Number etc.) assigned to each operation of the Inspection Plan.

Result Recording can be of 3 types:

Summarized recording

Single value recording

Classed recording

Imp Transactions:

QE51n – to carry out result recording

QE25 - to display the recorded result.

Based on the steps of result recording, different status are assigned to the characteristics:

1) Initial Status of each required characteristic is 1, for optional characteristics 0 (setting of control indicators in the inspection plan PLMK-STEUERKZ).


The screenshot shows the 'Record Results: Characteristic Overview' interface. The material is 100100, inspection lot is 89100000002, and operation is 0010. The table below shows the initial status of the characteristics.

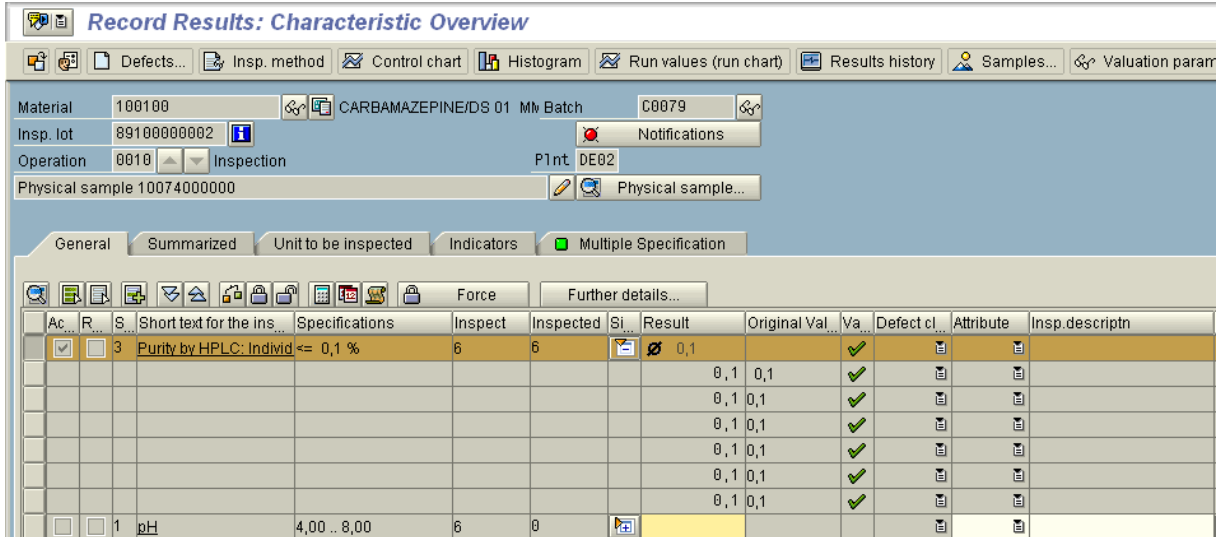
Ac	R	S	Short text for the ins...	Specifications	Inspect	Inspected	Si	Result	Original Val	Va	Defect cl	Attribute	Insp. descriptn
		1	Purity by HPLC: Individ <= 0,1 %		6	0							
		1	pH	4,00 .. 8,00	6	0							

2) Once the values are entered the status changes to 2





















The screenshot shows the same interface after recording a result. The status of the first characteristic has changed to 2, and a result of 0,1 has been entered.


Ac	R	S	Short text for the ins...	Specifications	Inspect	Inspected	Si	Result	Original Val	Va	Defect cl	Attribute	Insp. descriptn
		2	Purity by HPLC: Individ <= 0,1 %		6	1		= 0,1					
								0,1	0,1		✓		

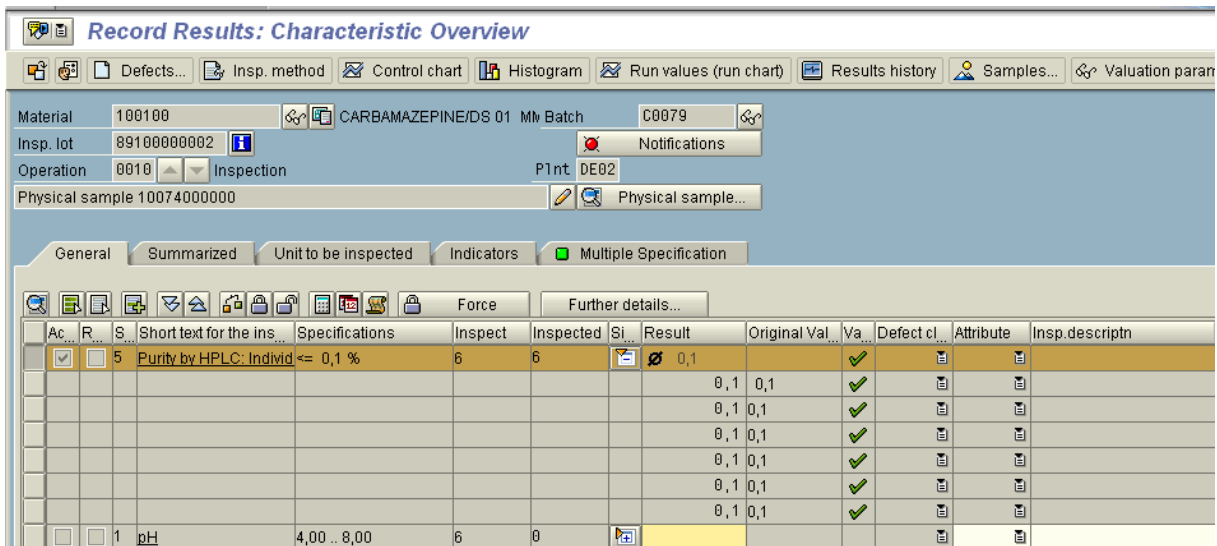
3) Valuation  changes the status to 3























The screenshot shows the SAP Record Results: Characteristic Overview interface. The material is 100100, CARBAMAZEPINE/DS 01, Mn Batch C0079. The inspection lot is 89100000002. The operation is 0010, Inspection. The physical sample is 10074000000. The result is 0,1. The status is 3. The result is marked as 'Valued' (green checkmark).

Ac	R	S	Short text for the ins...	Specifications	Inspect	Inspected	Si	Result	Original Val	Va	Defect cl	Attribute	Insp. descriptn
<input checked="" type="checkbox"/>		3	Purity by HPLC: Individ	<= 0,1 %	6	6		0,1	0,1	0,1			
								0,1	0,1	0,1			
								0,1	0,1	0,1			
								0,1	0,1	0,1			
								0,1	0,1	0,1			
		1	pH	4,00 .. 8,00	6	0							

4) Final step is to close  the result which changes the status to 5



The screenshot shows the SAP Record Results: Characteristic Overview interface. The material is 100100, CARBAMAZEPINE/DS 01, Mn Batch C0079. The inspection lot is 89100000002. The operation is 0010, Inspection. The physical sample is 10074000000. The result is 0,1. The status is 5. The result is marked as 'Closed' (green checkmark).

Ac	R	S	Short text for the ins...	Specifications	Inspect	Inspected	Si	Result	Original Val	Va	Defect cl	Attribute	Insp. descriptn
<input checked="" type="checkbox"/>		5	Purity by HPLC: Individ	<= 0,1 %	6	6		0,1	0,1	0,1			
								0,1	0,1	0,1			
								0,1	0,1	0,1			
								0,1	0,1	0,1			
								0,1	0,1	0,1			
		1	pH	4,00 .. 8,00	6	0							

If a closed result is reopened , the status changes to 2 again and the result values can be changed.

There are multiple SAP tables for storing the data for result recording

QAMR - Characteristic results during inspection processing (mean value for the characteristic in the operation)

Important fields:

PRUEFLOS	Insp. Lot number
VORGLFNR	Internal counter for Operation in Insp. Plan. Its relation with actual operation number is explained later
MERKNR	Inspection Characteristic Number
MBEWERTG	Inspection Result Valuation, whether valuation is accepted or rejected
MAXWERT	Maximum Value of the Valid Measured Values
MINWERT	Minimum Value of the Valid Measured Values
MITTELWERT	Arithmetic Mean of Valid Measured Values
ORIGINAL_INPUT	Original Value Before Input Processing

QAMV - Characteristic specifications for inspection processing

Important fields:

PRUEFLOS	Insp. Lot number
VORGLFNR	Internal counter for Operation in Insp. Plan. Its relation with actual operation number is explained later
MERKNR	Inspection Characteristic Number
SATZSTATUS	Specification Record Status
VERWMERKM	Master Inspection Characteristics
KURZTEXT	Short Text for the Inspection Characteristic
LTEXTKZ	Flag for long text exists
TOLERANZOB	Upper Specification Limit
TOLERANZUN	Lower Tolerance Limit

QASE – Results table for the sample unit .This table is filled in case of single value result recording

Important fields:

PRUEFLOS	Insp. Lot number
VORGLFNR	Internal counter for Operation in Insp. Plan. Its relation with actual operation number is explained later
MERKNR	Inspection Characteristic Number
DETAILERG	Number of the Individual Result
PROBENR	Sample Number
STUECKNR	Counter for Inspection Unit Number
MESSWERT	Measured Value for a Sample Unit
ORIGINAL_INPUT	Original Value Before Input Processing

QASR – Sample results for inspection characteristics. This table is filled if the inspection lot was created with inspection points (physical samples). It contains the mean value valid for the inspection point (physical sample).

Important fields:

PRUEFLOS	Insp. Lot number
VORGLFNR	Internal counter for Operation in Insp. Plan. Its relation with actual operation number is explained later
MERKNR	Inspection Characteristic Number
PROBENR	Sample Number
SATZSTATUS	Results Record Status
MBEWERTG	Inspection Result Valuation
PRLTEXTKZ	Inspection Characteristic Long Text Exists
MAXWERT	Maximum Value of the Valid Measured Values
MINWERT	Minimum Value of the Valid Measured Values
MITTELWERT	Arithmetic Mean of Valid Measured Values

Quality Notifications

Notifications are used to record various types of problems or defects which are encountered during result recording.

A basic quality notification has following structure

Notification Header

This contains general information related to notification like type of notification, its current status, Organizational data, Reference Objects etc. We can also have Tasks/Activities defined at header level.

QM03 is the tcode to display notification.

QMEL is the SAP database table for Notification Header.

Important fields.

QMNUM	Notification Number
QMART	Notification Type
QMTXT	Short Text
PRUEFLOS	Inspection Lot Number
CHARG	Batch number
MAWERK	Plant for Material
OBJNR	Object Number for Status Management

Apart from above fields, this table contains information based on the type of notification like sales order related reference, purchase order related reference, material document related reference, process order reference etc.

This table can be appended with custom fields if needed.

Notification Item

Each item in the notification indicates a defect recorded. There could be one or more items. Each item in turn have a cause, task and activity.

QMFE is the table for Quality notification – items.

Important fields.

QMNUM	Notification Number
FENUM	Item Number in Item Record
FEKAT	Catalog Type for Defect
FEGRP	Code Group for Defect
FECOD	Code for Defect
OTKAT	Catalog Type for Defect Location
OTGRP	Code Group for Defect Location
OTEIL	Code for Defect Location

Cause

A 'Cause' is basically reason or event that led to the occurrence of a notification item. A cause item contains the following information:


Code group


Code

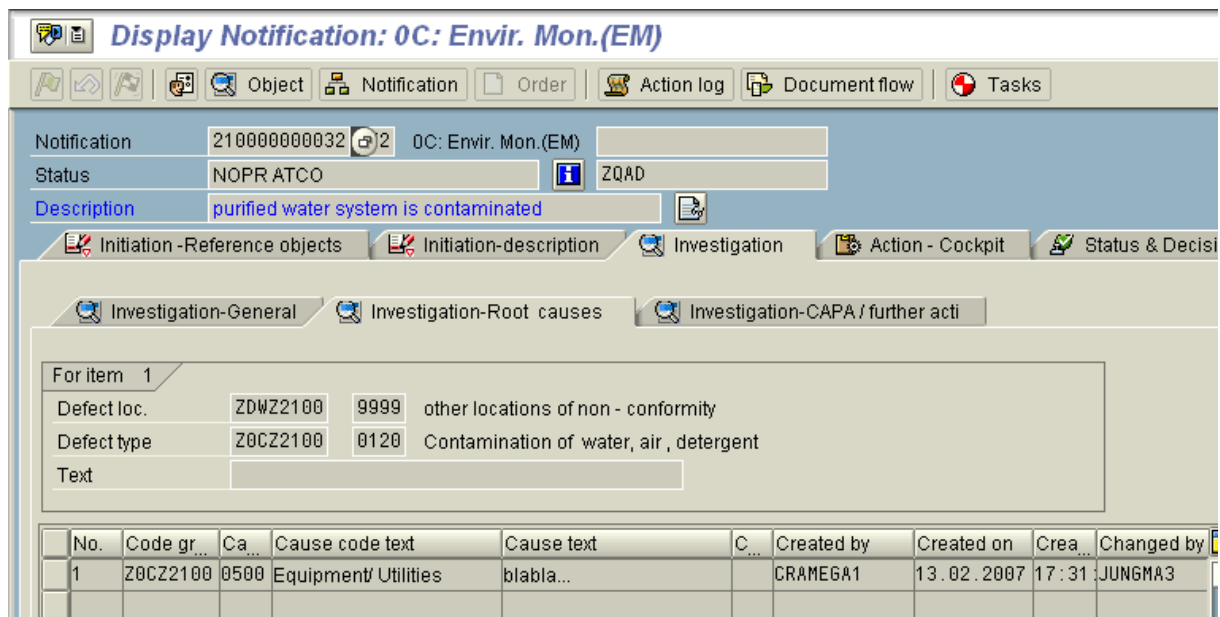
Short text

Long text

A defect item can have one or more causes.

 Investigation-Root causes

You can select the item and then go to tab  to display the causes attached to it.



The screenshot shows the SAP QM notification display for '0C: Envir. Mon.(EM)'. The notification number is 210000000032. The status is NOPR ATCO. The description is 'purified water system is contaminated'. The investigation tab is active, showing the 'Investigation-Root causes' sub-tab. The causes are listed in a table below.

No.	Code gr...	Ca...	Cause code text	Cause text	C...	Created by	Created on	Crea...	Changed by
1	Z0CZ2100	0500	Equipment/ Utilities	blabla...		CRAMEGA1	13.02.2007	17:31	JUNGMA3

QMUR is the table for Quality notification – causes.

Important fields.

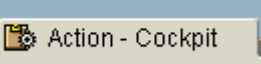
QMNUM	Notification Number
FENUM	Item Number in Item Record
URTXT	Cause Text
URKAT	Catalog Type - Causes
URGRP	Code Group - Causes
URCOD	Cause Code

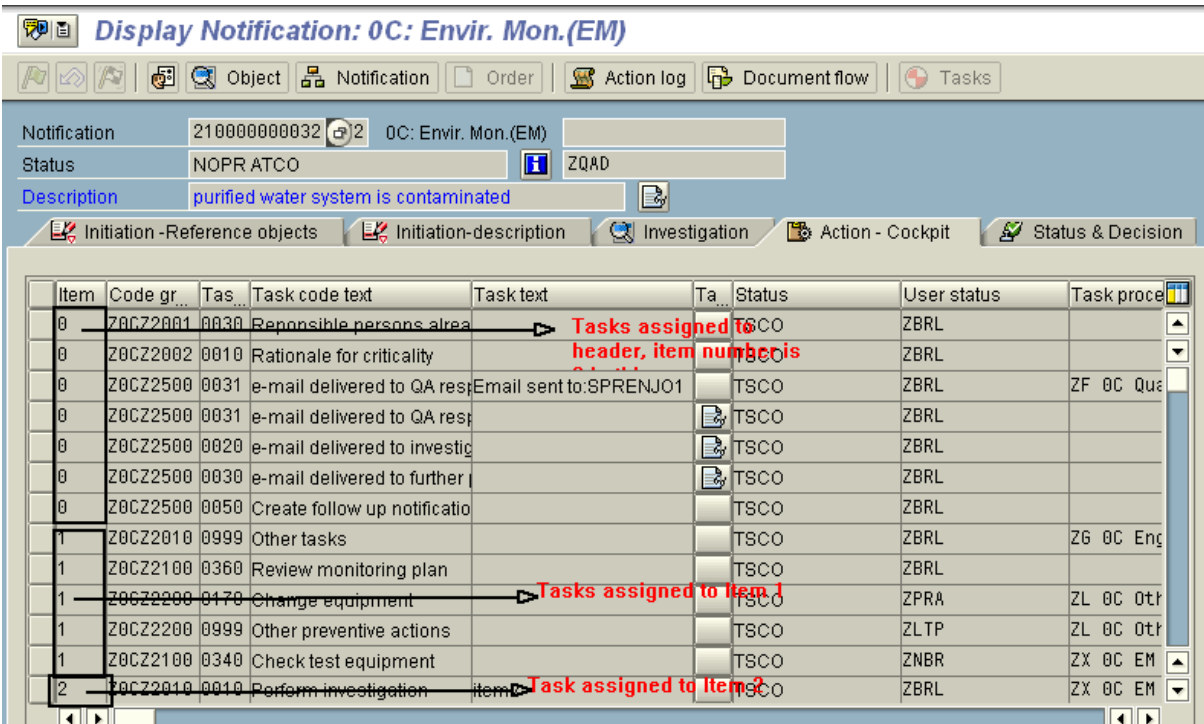
Task

Tasks are basically set of steps that need to be carried out to process and close the notification.

Tasks can be defined to both notification header and individual items.

Each Task is assigned to a responsible person, planned end and start date.

In QM03, tasks are displayed in tab 



Display Notification: 0C: Envir. Mon.(EM)

Notification: 210000000032 0C: Envir. Mon.(EM)

Status: NOPR ATCO ZQAD

Description: purified water system is contaminated

Initiation - Reference objects | Initiation-description | Investigation | **Action - Cockpit** | Status & Decision

Item	Code gr...	Tas...	Task code text	Task text	Ta...	Status	User status	Task proce
0	Z0CZ2001	0030	Responsible persons alrea	Tasks assigned to header, item number is	TSCO	TSCO	ZBRL	
0	Z0CZ2002	0010	Rationale for criticality		TSCO	TSCO	ZBRL	
0	Z0CZ2500	0031	e-mail delivered to QA resp	Email sent to:SPRENJO1	TSCO	TSCO	ZBRL	ZF 0C Qua
0	Z0CZ2500	0031	e-mail delivered to QA resp		TSCO	TSCO	ZBRL	
0	Z0CZ2500	0020	e-mail delivered to investig		TSCO	TSCO	ZBRL	
0	Z0CZ2500	0030	e-mail delivered to further		TSCO	TSCO	ZBRL	
0	Z0CZ2500	0050	Create follow up notificatio		TSCO	TSCO	ZBRL	
1	Z0CZ2010	0999	Other tasks		TSCO	TSCO	ZBRL	Z6 0C Eng
1	Z0CZ2100	0360	Review monitoring plan		TSCO	TSCO	ZBRL	
1	Z0CZ2200	0470	Change equipment	Tasks assigned to Item 1	TSCO	TSCO	ZPRA	ZL 0C Otr
1	Z0CZ2200	0999	Other preventive actions		TSCO	TSCO	ZLTP	ZL 0C Otr
1	Z0CZ2100	0340	Check test equipment		TSCO	TSCO	ZNBR	ZX 0C EM
2	Z0CZ2010	0010	Perform investigation	Task assigned to Item 2	TSCO	TSCO	ZBRL	ZX 0C EM

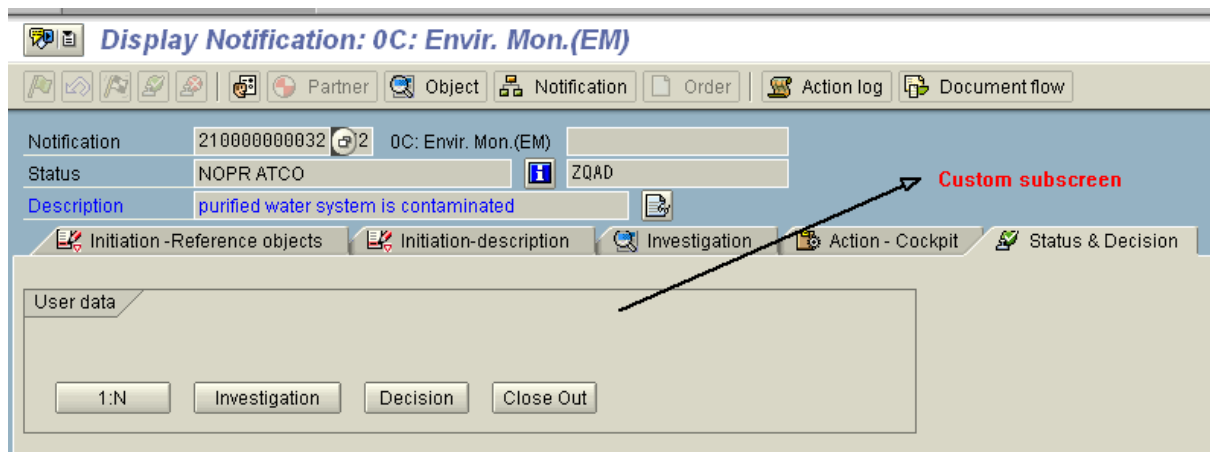
QMSM is the table for Quality notification – tasks

Important fields.

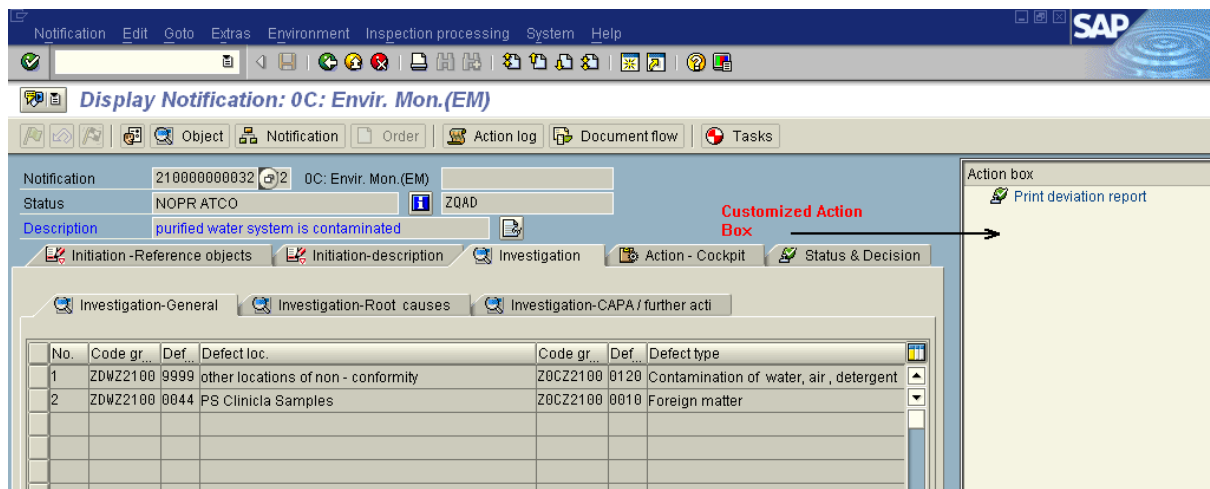
QMNUM	Notification Number
MNKAT	Catalog Type - Tasks
MNGRP	Code Group - Tasks
MNCOD	Task Code
MATXT	Short Text for Task
PSTER	Planned Start Date
PETER	Planned finish date
OBJNR	Object Number for Status Management
FENUM	Item Number in Item Record
PARNR	Person Responsible for Task (Partner Number)

Customizing that can be done in Quality notifications tcode:

SAP provides screen exit to add custom subscreen in QM01/QM02/QM03.



At the left, space is provided to create action box. Which provides option to carry out various follow-up actions on the notification.



Technically these follow-up actions are assigned to function modules.

View V_TQ85 contains the assignment of various action boxes to each notification type and also the related FM.

This view can also be used to add new action box to the notification type.

Quality Certificates

Quality certificate is the assurance of quality of goods. In QM for SD scenario, this certificate is to be provided to customer when the delivery is issued.

Certificate can be created for:

Inspection lot – This contains the Inspection Result

Batch – this contains the characteristic of batch

Delivery position – this may contain results of several batches (in case of batch split in delivery)

The content of the certificate comes from Certificate profile. Certificate profile contains the selection and sequence of the characteristics whose results are to be documented on the certificate.

QC03 – Tcode to display certificate profile

QCVK is the table for certificate profile header.

QCVM is the table to hold certificate profile information at characteristic level.

The form for Quality Certificates are created as SAP script. Standard report **RQCAAP01** is used to create Certificate of Analysis(CoA).

This report can be customized by copying and can be also attached to smartform if required.

Digital Signature in SAP QM

The SAP System provides the tool to identify and approve digital data. The digital signature ensures that certain tasks are only performed by specially authorized users and

documented in a signed document together with the name of the undersigned person, and the date and time. The digital signature are needed to meet the GMP guidelines (Good Manufacturing Practices) for the approval of quality-related processes and documentation.

In QM digital signature can be used for the following functions:

During results recording

At the usage decision

When confirming the physical-sample drawing. This means, when releasing the first physical sample in a physical-sample drawing.

If you want to add Digital Signature to any custom development Class can be used for the purpose DSZ46C_CL_DS_RUNTIME.

Status Management

In status management we define various status through which an object goes through in its entire lifecycle.

The status can be of two types:

System status – This status is set by the system according to the status profile assigned to the object

User status- These are custom defined status and are maintained in customizing.

In QM following objects have system status management activated:

Inspection Lots

Physical samples

Quality Notifications headers

Quality Notification tasks

Certificate profiles

For all the objects, the status history is updated in table **JEST**.

The current status is indicated by JEST-INACT = ' '. For all the objects you can find the object number (OBJNR) in their corresponding master tables.

The relationship for each status and its corresponding status profile can be found in **JSTO**.

The texts for user status can be found in **TJ30T** and the texts for system status can be found in **TJ02T**.

The function modules for changing status are STATUS_CHANGE_INTERN (System status) and STATUS_CHANGE_EXTERN (user status).

Related Content

<http://help.sap.com/>

<http://www.sap-img.com/sap-qm.htm>

<http://www.easymarketplace.de/online-pdfs-q-s.php>

For more information, visit the [ABAP homepage](#).

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