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| --- | --- | --- | --- |
| **Author** | | **Review** | **Approval** |
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|  | |  |  |
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|  | |  |  |
| **Executive**  **Summary** | This document presents the quality metrics of the Audi Tranche 6 regarding the P30 version. | | |

Audi Trache 6:

Software QualiTy METRICS report

ON P30 Version

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# General Information

## Revision history

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision** | **Date** | **Author(s)** | **Description/comment** |
| 1.1. | 22.04.2020 | M. Chiriac | First release |
| 1.2. | 21.07.2020 | Vulpe Anca | Second release |
| 1.3 | 18.12.2020 | Dan Nitulescu | Third release |
| 1.4 | 02.02.2021 | Obada Mirela | QAC\_Metrics report update for P25 |
| 1.5 | 02.02.2021 | Obada Mirela | Add all components in metrics report |
| 1.7 | 02.08.2021 | Dan Dustinta | Update report for P30 |

## Purpose and Scope

The purpose of this report is to describe the software code analysis done with QAC on all software components used by the P25.

* Product: **Audi Trache 6**
* Software Version: **P30**
* QAC version: **8.1.2.R**

## Referenced documents

|  |  |  |
| --- | --- | --- |
| **Id** | **Document name** | **Location** |
|  | PP4G\_QAC\_Analysis.py | [*S:\Metrics\Static\_Analysis*](file:///S:\Metrics\Static_Analysis) |
|  | QAC\_Warning\_Report.xlsx |
|  | QAC\_Metrics\_Report.xlsx |
|  | Audi\_Tranche6\_SW\_Coding\_Rules\_User\_Guide.docx | [*s:\Methods\HowTo\*](file:///s:\Methods\HowTo\) |
|  | MISRA C 2012 | *MISRA C Guidelines* |

## Terminology and definitions

|  |  |
| --- | --- |
| **Terminology** | **Meaning** |
|  |  |

# Metrics Acceptability Criteria

The metrics acceptability criteria used to obtain a good software quality are defined in [Ref4].

# List of the improvable functions

This table is extracted from **Improvable** Excel sheet in ***QAC\_Metrics\_Report.xlsx*** *[Ref3].* This shows which functions do not meet the metrics acceptability criteria defined in Chapter 2. For more details please see [Ref3].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| File Name | Function Name | Justification | Action | Status |
| AdcIf.c 1.14.2.6 | AdcIf\_runEndOfConversion | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| ATM.c 1.1.1.6.2.13 | atm\_SetDemEvent | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| ATM.c 1.1.1.6.2.13 | atm\_PlayOneShotTests | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BFD\_exec.c 1.31 | BFD\_ExecSetCycle | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BFD\_exec.c 1.31 | BFD\_ExecCycle | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BFD\_exec.c 1.31 | BFD\_MainFunction | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BMM.c 1.1.1.16.1.15 | OS\_ISR\_BMM\_HES\_IT | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BMM.c 1.1.1.16.1.15 | OS\_ISR\_BMM\_TimerOverflow | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BMM.c 1.1.1.16.1.15 | BMM\_runMainFunction | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BswM\_Callouts.c 1.39 | BswM\_OnStartupTwoA | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BswM\_Callouts.c 1.39 | BswM\_OnStartupTwoB | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BswM\_Callouts.c 1.39 | BswM\_OnStartComEffective | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BswM\_Callouts.c 1.39 | BswM\_On\_Prep\_Shutdown\_B | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BswM\_Callouts.c 1.39 | BswM\_OnGoOffOneA | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| BswM\_Callouts.c 1.39 | OS\_TASK\_OsTask\_ReadWrite\_AllProcess | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_AppliToCAN.c 1.1.1.10.2.122 | cil\_ComputeSignalStatus | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_AppliToCAN.c 1.1.1.10.2.122 | CIL\_runAppliToCAN | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_AppliToCAN.c 1.1.1.10.2.122 | CIL\_runCANToAppli | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_CANToAppli.c 1.1.1.3.4.109 | CIL\_runGetActivationRequest | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_CANToAppli.c 1.1.1.3.4.109 | CIL\_runDetermineEcuLocation | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_CANToAppli.c 1.1.1.3.4.109 | cil\_Update\_07Cx\_Block05\_InfosToSend | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| CIL\_Init.c 1.1.1.3.3.17 | cil\_Update\_07Cx\_Block15\_InfosToSend | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Dcm\_Callouts.c 1.10 | Dcm\_WriteMemory | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Dcm\_Callouts.c 1.10 | Dcm\_ReadMemory | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Dcm\_Callouts.c 1.10 | Dcm\_SetProgConditions | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DemIf.c 1.17 | DemIf\_UpdateApplicationCrc | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA.c 1.1.1.23.2.32 | DIA\_SelectNvMWriteBlock | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA.c 1.1.1.23.2.32 | DIA\_SelectNvMGetErrorStatus | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA.c 1.1.1.23.2.32 | Dcm\_DcmDsdSid14TabFnc | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA.c 1.1.1.23.2.32 | DcmDsdSubService\_01\_SID28\_CommunicationControl | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA.c 1.1.1.23.2.32 | DcmDsdSubService\_00\_SID28\_CommunicationControl | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA.c 1.1.1.23.2.32 | DIA\_runServiceRequestIndication | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ECUReset.c 1.1.3.6.2.8 | DIA\_runDidFD08\_ResetCauseRead | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ECUReset.c 1.1.3.6.2.8 | DIA\_runDidFE00\_AllEventStatusesRead | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ReadDataByIdentifier.c 1.1.1.23.2.67.1.13 | DIA\_runDid23E0\_ReadRGSStatusLeft | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ReadDataByIdentifier.c 1.1.1.23.2.67.1.13 | DIA\_runDid23E8\_ReadRGSStatusRight | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ReadDataByIdentifier.c 1.1.1.23.2.67.1.13 | DIA\_runDidF15B\_FingerprintAndProgrammingDateRead | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ReadDataByIdentifier.c 1.1.1.23.2.67.1.13 | DIA\_runRidF782\_EraseAllStart | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ReadDataByIdentifier.c 1.1.1.23.2.67.1.13 | DIA\_runRidF782\_EraseAllRequestRes | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_ReadDataByIdentifier.c 1.1.1.23.2.67.1.13 | DIA\_runRid0544\_VerifyPartialSoftwareChecksumStart | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_RoutineControl.c 1.1.1.26.2.38 | DIA\_runSecurityAccessCompareKey | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_RoutineControl.c 1.1.1.26.2.38 | bIsAsciiCharAllowedAUDI | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_RoutineControl.c 1.1.1.26.2.38 | WriteStepsParameters | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_RoutineControl.c 1.1.1.26.2.38 | WriteCyclesParameters | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_SecurityAccess.c 1.1.1.5.1.5 | DIA\_runDidFD8C\_ECUSerialNumberWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_SecurityAccess.c 1.1.1.5.1.5 | DIA\_runDidF197\_VWSystemNameServiceWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_SessionControl.c 1.1.1.3.1.3 | DIA\_runDidF191\_VWHardwareNumberServiceWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidF1A3\_VWEcuHardwareVersionNumberWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidF187\_VWSparePartNumberWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidFD2F\_EcuLocationWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidFD31\_EcuCalibrationParametersWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidF18C\_BeltAssemblySerialNumberWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidFD83\_BeltFunctionsEnableStatusWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| DIA\_WriteDataByIdentifier.c 1.1.1.37.2.43.1.3 | DIA\_runDidFDFF\_MeasurementFrameBlk12confWrite | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| EcuM\_Callout\_Stubs.c 1.21 | EcuM\_SleepActivity | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| EOL.c 1.1.1.9.1.7 | ManageCycleCounters | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| EOL.c 1.1.1.9.1.7 | M\_u8getCounterIndex | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| EOL.c 1.1.1.9.1.7 | EOL\_Init | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| AEC\_calibration.c Unknown | erh\_ManageFailedCounterEvent | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| ERH.c 1.2.5.18 | ERH\_runStoreEverQualifiedAECsToNVP | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| ERH.c 1.2.5.18 | ERH\_runSetAecEvent | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| ERH.c 1.2.5.18 | ERH\_ResetAllAECStatus | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MIC.c 1.1.1.11.1.3 | MIC\_MachineExceptionInterrupt | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MIC.c 1.1.1.11.1.3 | MIC\_Init | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MMG.c 1.1.1.2.2.13 | CheckIfCycleIsEnabled | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MMG.c 1.1.1.2.2.13 | MMG\_runUpdateModeStatus | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MMG.c 1.1.1.2.2.13 | UpdateModeStatus\_InhibitionOfCyclesByInternalFailure\_AllCycles | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MMG\_BatteryModes.c 1.1.1.2.1.2 | UpdateModeStatus\_InhibitionOfCyclesByInternalFailure\_TensioningCycles | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| MMG\_CommunicationModes.c 1.1.1.3.3.3 | UpdateModeStatus\_InhibitionOfNmModes | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Nm\_ExtraCallbacks.c 1.31 | NmIf\_SetNMSignals | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Nm\_ExtraCallbacks.c 1.31 | NmIf\_MainFunction | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| NvmIf.c 1.11.1.7 | NvmIf\_ReadBlockByAddress | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| NvmIf.c 1.11.1.7 | NvmIf\_Autotest\_RunEepromMemoryNotProgrammed | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | pal\_u8PreBoostStep\_1 | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | pal\_u8PreBoostStep\_4 | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | pal\_u8VBoostDischarge | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | pal\_u8VBoostStep\_1 | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | pal\_u8VBoostStep\_2 | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckMosfetOCAT | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckPreliminaryBoost | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckVBoost | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckHighSideSwRegulation | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckMotorCurrent | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckMotorPowerOrder | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckMotorDisengagement | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PAL\_Autotests.c 1.1.1.9.3.7 | PAL\_Autotest\_CheckMotorSC | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| PMP.c 1.1.1.10.1.11 | PMP\_runComputeDeficiencyLevel | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Rcm.c 1.1.1.17.1.8 | RCM\_runDetermineResetCause | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Scm.c 1.1.1.6.1.14 | scm\_ManageSystemContextStorage | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Scm.c 1.1.1.6.1.14 | SCM\_runMonitoreExecutedCycle | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Scm.c 1.1.1.6.1.14 | scm\_RecoverSystemContextContent | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Scm\_Cfg.c 1.1.1.12.1.16 | SCM\_RecoverSystemContext | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| Scm\_Cfg.c 1.1.1.12.1.16 | SCM\_StoreSystemContext | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| SpiIf.c 1.8.2.6 | SpiIf\_DetermineSBCErrors | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| SpiIf.c 1.8.2.6 | SpiIf\_ClearStateAndReport | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| SpiIf.c 1.8.2.6 | SpiIf\_Init | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| SpiIf.c 1.8.2.6 | SpiIf\_Shutdown | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| SpiIf.c 1.8.2.6 | SpiIf\_SetToLowPower | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |
| App\_startup.c 1.2 | RAM\_InitData | Out of bounds metrics have no functional impact | NONE | JUSTIFIED |

# Warnings report

Following table is extracted from **Warnings\_metrics** Excel sheet in ***QAC\_Warning\_Report.xlsx*** [Ref2]. The warning are reported according to Ref[5].

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Component** | **Warnings** | **Warnings with Severity Level <=2** | **Warnings with Severity Level <= 5** | **Warnings with Severity Level > 5** | **To be corrected** |
| AdcIf | 172 | 86 | 37 | 49 | 0 |
| ATM | 140 | 27 | 36 | 77 | 0 |
| BFD | 352 | 86 | 123 | 143 | 0 |
| BFE | 0 | 0 | 0 | 0 | 0 |
| BFS | 0 | 0 | 0 | 0 | 0 |
| BMM | 147 | 76 | 48 | 23 | 0 |
| BPA | 0 | 0 | 0 | 0 | 0 |
| BswMIf | 25 | 17 | 4 | 4 | 0 |
| CanTrcvIf | 23 | 17 | 0 | 6 | 0 |
| CIL | 520 | 146 | 141 | 233 | 0 |
| CompilerIf | 0 | 0 | 0 | 0 | 0 |
| DcmIf | 45 | 32 | 8 | 5 | 0 |
| DemIf | 86 | 48 | 22 | 16 | 0 |
| DIA | 1681 | 725 | 274 | 682 | 0 |
| EcuMIf | 114 | 65 | 25 | 24 | 0 |
| EOL | 153 | 41 | 51 | 61 | 0 |
| ERH | 509 | 497 | 2 | 10 | 0 |
| FlsIf | 6 | 2 | 1 | 3 | 0 |
| HWA | 0 | 0 | 0 | 0 | 0 |
| IVD | 0 | 0 | 0 | 0 | 0 |
| MIC | 126 | 32 | 54 | 40 | 0 |
| MMG | 276 | 82 | 60 | 134 | 0 |
| NmIf | 58 | 16 | 23 | 19 | 0 |
| NvmIf | 68 | 39 | 3 | 26 | 0 |
| NVP | 18 | 12 | 0 | 6 | 0 |
| OS | 0 | 0 | 0 | 0 | 0 |
| OsIf | 11 | 5 | 1 | 5 | 0 |
| PAL | 453 | 132 | 134 | 187 | 0 |
| PlatformsIf | 0 | 0 | 0 | 0 | 0 |
| PMP | 164 | 62 | 44 | 58 | 0 |
| PortIf | 52 | 4 | 25 | 23 | 0 |
| PRO | 0 | 0 | 0 | 0 | 0 |
| PwmIf | 16 | 15 | 0 | 1 | 0 |
| RCM | 41 | 20 | 1 | 20 | 0 |
| RTE | 0 | 0 | 0 | 0 | 0 |
| RteIf | 0 | 0 | 0 | 0 | 0 |
| SBC | 2 | 0 | 1 | 1 | 0 |
| SCM | 139 | 63 | 19 | 57 | 0 |
| SFR | 0 | 0 | 0 | 0 | 0 |
| SpiIf | 158 | 108 | 0 | 50 | 0 |
| Startup | 67 | 25 | 28 | 14 | 0 |
| STM | 12 | 8 | 0 | 4 | 0 |
| TL\_Lib | 26 | 18 | 0 | 8 | 0 |