

/Z123STM_INT/APP Rules

Apprules

Application rules document

Baseline: 3.0 (Rev_valid_09)
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ID	Application rule	Documents for rule deployment	Fulfilment of rule
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DIS: G81001-X3107-L005

Author: Steen Noergaard

ID	Application rule	Documents for rule deployment	Fulfilment of rule
AppRule_124	1 Change list		
AppRule_127	1.1 Version 06		
AppRule_128	Date: 2014-07-14		
AppRule_129	Author: Frank Elm Jakobsen		
AppRule_130	changed section: all reason for change: Transfer from Word ver 05 to DOORS New ver. of SyArchSpec to Ver. 14		
AppRule_131	Review: See review documentation (G81001-X3107-L005-06)		
AppRule_170	1.2 Version 07		
AppRule_171	Date: 2015-03-09		
AppRule_172	Author: Frank Elm Jakobsen		
AppRule_173	changed section: all reason for change: Corrections and clarifications to requirements New column "Fulfilment of rule" facilitates apportionment of rules New ver. of SyArchSpec to Ver. 15		
AppRule_179	1.3 Version 08		
AppRule_180	Date: 2016-04-07 Author: Jens Peter Haugaard changed section: Added AppRule_175, 176, 177, and 178. reason for change: Addition of application rules for customized DMI.		
AppRule_182	1.4 Version 09		
AppRule_183	Date: 2017-08-14 Author: Steen Nørgaard changed section: Changed: All AppRules which refers to documentation has now a reference to the chapters, where they belong Deleted: AppRule_4, 17, 46, 64, 65, 68, 69, 73, 76, 78, 80 - 89, 91 - 95, 175 - 178 99 - 103 (according to BDK Hazard Report) 175 -178 reason for change: Adapted to show only rules to the the scope of STM-DK.		

ID	Application rule	Documents for rule deployment	Fulfilment of rule
AppRule_132	2 Validity and purpose		
AppRule_133	<p>Validity</p> <p>The rules stated in this document are valid for the use of the STM-DK in all other projects.</p> <p>Purpose</p> <p>This document states the rules that must be followed to use the STM-DK application in safety related train installations.</p>		

ID	Application rule	Documents for rule deployment	Fulfilment of rule										
AppRule_134	3 References												
AppRule_135	3.3 Terms and Abbreviations												
AppRule_138	Universally valid abbreviations are explained in this document:[Glossary] In addition, the following abbreviations are used here:												
AppRule_139	<table border="1"> <thead> <tr> <th>Abbreviation</th> <th>Term</th> </tr> </thead> <tbody> <tr> <td>EVC</td> <td>European Vital Computer</td> </tr> <tr> <td>ADSC</td> <td>Application Design Safety Case</td> </tr> </tbody> </table>	Abbreviation	Term	EVC	European Vital Computer	ADSC	Application Design Safety Case						
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AppRule_117	<table border="1"> <thead> <tr> <th>Reference ID</th> <th>Document incl. Title, Unequivocal identifier and version</th> </tr> </thead> <tbody> <tr> <td>SyArchSpec</td> <td>System Architecture specifications G81001-X3107-R004-19 DOORS: /Z123STM_INT/20_Arch/SyArchSpec baseline 19</td> </tr> <tr> <td>SyValRep</td> <td>System Validation Report G81001-X3107-U010-03 G81001-X3107-U547-07</td> </tr> <tr> <td>GASC</td> <td>G81001-X3107-U405-07</td> </tr> <tr> <td>BDK Hazard Report</td> <td>Fjernbane Onboard Baseline 3 Hazard Record Report, SP-FB-FOB-006263 from version 9</td> </tr> </tbody> </table>	Reference ID	Document incl. Title, Unequivocal identifier and version	SyArchSpec	System Architecture specifications G81001-X3107-R004-19 DOORS: /Z123STM_INT/20_Arch/SyArchSpec baseline 19	SyValRep	System Validation Report G81001-X3107-U010-03 G81001-X3107-U547-07	GASC	G81001-X3107-U405-07	BDK Hazard Report	Fjernbane Onboard Baseline 3 Hazard Record Report, SP-FB-FOB-006263 from version 9		
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AppRule_123	4 Application rules																										
AppRule_140	The following table states the rules that has to be followed when using the STM-DK application in a safety relevant train installation.																										
AppRule_1	Don't place higher demands on the TCC than stated in EN50124-1 Pollution degree PD2; EN50124-1 Excess voltage cat. OV2; EN 60664-1 The STM-DK must not be used at higher altitude than 4000 meter above sea level.	/Installation manual/	Installation																								
AppRule_2	Regarding climate requirements don't place higher demands on the TCC than EN50155 class TX If external ventilation of the TCC cabinet is used, special attention may be needed.	/Installation manual/	Installation																								
AppRule_3	The user of the tiu function shall use an idle cycle timeout that enables reconnecting the profibus connection for the tiu function in less than 1,5 seconds. This can be understood as a requirement for 1 second timeout value on TIU connections.	BDK design requirements for the EVC	EVC																								
AppRule_5	The maximum system speed at HS-area shall be covered by trackside engineering	BDK track engineering	Bdk																								
AppRule_6	The STM shall have the possibility to use indicators on 5 positions on the DMI. The mapping shall be: <table border="1" data-bbox="262 1092 1272 1733"> <thead> <tr> <th>NID_INDPOS</th> <th>Position CENELEC</th> <th>Position ERA</th> <th>Indication</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>C5</td> <td>C2</td> <td>DRIFTSBREMSE (yellow) NØDBREMSE (red)</td> </tr> <tr> <td>6</td> <td>C6</td> <td>C3</td> <td>PASS STOP (red)</td> </tr> <tr> <td>7</td> <td>C7</td> <td>C4</td> <td>ATC INDE (green) RANGER (yellow) YDRE SIGNAL (yellow) LØS ATC (green)</td> </tr> <tr> <td>8</td> <td>C2</td> <td>C5</td> <td>Yellow display</td> </tr> <tr> <td>9</td> <td>C3</td> <td>C6</td> <td>Red display</td> </tr> </tbody> </table>	NID_INDPOS	Position CENELEC	Position ERA	Indication	5	C5	C2	DRIFTSBREMSE (yellow) NØDBREMSE (red)	6	C6	C3	PASS STOP (red)	7	C7	C4	ATC INDE (green) RANGER (yellow) YDRE SIGNAL (yellow) LØS ATC (green)	8	C2	C5	Yellow display	9	C3	C6	Red display	BDK design requirements for the EVC	EVC
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AppRule_7	The STM needs to use Buttons on 4 possible positions, the mapping shall be: <table border="1" data-bbox="262 1849 1272 2582"> <thead> <tr> <th>NID_BUTPOS</th> <th>Position CENELEC</th> <th>Position ERA</th> <th>Push Button</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>F6.</td> <td>F8.</td> <td>Valg Afbryd AFBRYD RANGER Retur</td> </tr> <tr> <td>2.</td> <td>F7.</td> <td>F9.</td> <td>RANGER YDRE SIGNAL LØS ATC</td> </tr> <tr> <td>3.</td> <td>F8.</td> <td>F10.</td> <td>PASS STOP LØS BREMSE (Yellow – driftsbremse) LØS BREMSE (red – nødbremse)</td> </tr> </tbody> </table>	NID_BUTPOS	Position CENELEC	Position ERA	Push Button	1.	F6.	F8.	Valg Afbryd AFBRYD RANGER Retur	2.	F7.	F9.	RANGER YDRE SIGNAL LØS ATC	3.	F8.	F10.	PASS STOP LØS BREMSE (Yellow – driftsbremse) LØS BREMSE (red – nødbremse)	BDK design requirements for the EVC	EVC								
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AppRule_8	The train data shall be displayed in order of the related N_ITER value in packet STM-179 (starting with the lowest value)	BDK design requirements for the EVC	EVC																								

ID	Application rule	Documents for rule deployment	Fulfilment of rule
AppRule_9	If the ETCS on-board is compatible to Baseline 2.3.0d, it shall additionally fulfill the requirements of UNISIG CR 618.	BDK design requirements for the EVC	EVC
AppRule_10	No higher demands than stated in EN61000-6-2 and EN50121-3-2 shall be placed on the STM. An extra external filter at the power input is needed. (i.e. SIFI-B).	/Installation manual/	Installation
AppRule_11	No higher demands regarding radiation than stated in EN61000-6-4 and EN50121-3-2 shall be placed on the STM.	/Installation manual/	Installation
AppRule_12	No higher demands regarding ESD than stated in EN61000-6-2 and EN50121-3-2 should be placed on the STM. It is expected that the STM is only accessed by maintenance staff.	/Installation manual/ /Maintenance Manual/	Installation Maintenance
AppRule_13	The shields of cables connected to the STM front connectors shall be electrically connected to the cabinet/chassis on both sides. All cable screens must be connected to the grounding pad before leaving the STM subrack.	/Installation manual/	Installation
AppRule_14	No 24V power supply at the front connectors must be used.	/Installation manual/	Installation
AppRule_15	Relay output contacts on the SRAUS5 shall not be loaded beyond the values stated in the technical specifications. 24V version: Max voltages: Max 31,2 VDC. Max 33,6 VDC for less than 1s. Max current: 1,5 A 110V version: Max voltages: Max 143 VDC. Max 154 VDC for less than 1s. Max current: 0,3 A All relay outputs shall be secured by fuses of maximum 2A. If the PS is not coming from the battery the allowed voltage tolerance is +- 30 %. Short voltages excursions (<1second) up to +40 % is allowed The safety is related to the max. value of +30% and shall not be exceeded. Example: Safety surveillance of interface voltage due to excess voltage in the PS.	/Installation manual/	Installation
AppRule_16	Inputs to the SRAUS5 bypass relays shall no be loaded beyond their technical specifications. Voltage range 24V version: 16.8 to 31.2 VDC; Voltage range 110V version: 77 to 143 VDC The tolerable voltage variation is +- 30 %. Short (less than 1s) voltages excursions up to + 40 % is allowed. The max. value of voltage is safety relevant and this must not be exceeded.	/Installation manual/	Installation
AppRule_18	This rule does not place any requirement to the user. Rule: The limits in data sheet (see Sec. 6.1 in manual) respectively the electrical specifications (see sec. 6.2 in manual) shall not be exceeded. Furthermore one shall take care of the potential separation and the quality of the used PS (see sec. 6.4 and 6.5 in the manual) when connecting to periphery. This could be fulfilled by the use of the TCC PS.	/GASC/	Don't use
AppRule_21	Selection of the required dimension for the connection cable to the SV5 shall be done according to /EN50343/	/Installation manual/	Installation

ID	Application rule	Documents for rule deployment	Fulfilment of rule
AppRule_25	<p>Only to be used in special diagnostic cases.</p> <p>A diagnostic interface (SUB-D-9) is available at the module UEBGEN5.</p> <p>When using the diagnostic interface data is transferred through the front connector from UEBGEN5 to TASSE5. The connections defined in this document UEBGEN5-HW-Schnittstelle shall be realised by the front connector wiring.</p> <p>The diagnostic PC shall be connected as described in /TASSE5-HW-Schnittstelle/ and UEBGEN5-HW-Schnittstelle to the Ethernet interface of the TASSE5.</p> <p>The operation of the UEBGEN5 diagnosis interface must be done over the Ethernet diagnosis connection at the TASSE5.</p> <p>During safety relevant TCC operation only the defined diagnosis commands in /Diagnoseschnittstelle/ shall be used.</p>	/Installation manual/	Installation
AppRule_26	<p>Connection of the antenna</p> <p>Use only the following antenna types: S25441-M1-A3 S25441-M1-A4 S25441-M2-A3 S25441-M2-A4</p> <p>Only shielded cable with specified data shall be used. Isolation min. 60Veff Impulse min. 1032Vp</p> <p>The housing of the antenna must be connected to the vehicle chassis with low impedance.</p> <p>The values for the antenna isolation between housing and internal electronics can be considered the same as for the cable. This is given for the mentioned antennas above.</p> <p>At the connection points it shall be ensured that re-inforced insulation to other potentials is sufficient according to EN50124-1</p> <p>When connecting the two wires (Fahrtrichtung A and Fahrtrichtung B) to the module (Uebgen5) the following apply:</p> <ul style="list-style-type: none"> - The two 100kHz connections shall be galvanic insulated from each other - The two 50kHz connections shall be galvanic insulated from each other 	/Installation manual/	Installation
AppRule_27	<p>This rule does not place any requirement to the user.</p> <p>rule:The limitations in the electric specification of the Profi5 on the data sheet (see sec. 2.1 in the manual) shall not be exceeded.</p>	/GASC/	Don't use
AppRule_28	When the TCC including the SV5 is used without cabinet (steel cabinet) the cable shielding of the SV5 connections shall also be connected near to the frame of the module.	/Installation manual/	Installation
AppRule_29	<p>An external filter (SIFI-E or similar) shall be inserted into the power connection to the SV5 power supply</p> <p>The filter shall be dimensioned according to power supply voltage and power consumption of the ZUB123-STM</p>	/Installation manual/	Installation
AppRule_31	The power cable for the SV5 shall be protected by a circuit breaker (over-current protection)	/Installation manual/	Installation
AppRule_32	<p>Make sure that the over-current protection for the SV5 works as follows:</p> <p>It shall protect the connected wires from overload.</p> <p>The inrush current shall not release circuit breaker</p> <p>The cable resistance shall not prevent releasing in case of short circuit.</p>	/Installation manual/	Installation
AppRule_34	<p>The ETCS Onboard shall support the STM Functions</p> <ul style="list-style-type: none"> • STM CONTROL • CLOCK • TIU • BIU • ODOMETER 	BDK design requirements for the EVC	EVC

ID	Application rule	Documents for rule deployment	Fulfilment of rule
AppRule_34	<ul style="list-style-type: none"> • JRU • DMI CAB A • DMI CAB B 		
AppRule_35	No higher mechanical demands should be placed on STM-DK than stated in EN50155 and IEC60571-1	/Installation manual/	Installation
AppRule_36	No higher demands regarding fluctuations in power source should be placed on STM-DK than defined in /EN50155/	/Installation manual/	Installation
AppRule_37	Check after first start up and after maintenance work that the STM-DK starts up correctly. Verify that the self test has been run without errors.	/Installation manual/ /Maintenance Manual/	Installation Maintenance
AppRule_38	No module should be pulled out while power is on for the STM-DK.	/Installation manual/ /Maintenance Manual/	Installation Maintenance
AppRule_39	<p>When loading software to the Data processing module the following items must be used in the version mentioned or newer:</p> <p>OrderPublisherPlugin mit Plugin v2.1</p> <p><u>Target Tool Set, Release 4.5.0:</u></p> <p>genesis.exe – MD4: 242c660fda38bd5084d58ed22248e73c 2006-09-01 12:53:35 genesis.cpp”</p> <p>Babbl, Version 2.6.0.0 vom 2006-08-28</p> <p>Exodus, Version 2.7.0.1 vom 2006-09-04</p> <p>(Hint: Exodus, Version 2.7.1.0 vom 2007-02-07, - Improved communication with DIMO when sealing)</p> <p>Referenzhandbuch Genesis, BAB Generiertool, P25020-G3001-A2-11-D5</p>	/SW instruction/	Production
AppRule_40	<p>After loading software and before operation is started the operator must make sure at the first startup of the new software that:</p> <ul style="list-style-type: none"> • the program memory is sealed • the correct software version is loaded. • the loading session has ended • the software has started up correctly 	/SW instruction/	Production
AppRule_41	Do not use the “prüfgeräte” test input connection at the TASSE5 during safe operation.	/Installation manual/	Installation
AppRule_42	<p>Unused connector on Uebgen module must not be used:</p> <p>Two FUE outputs could be used for non safety purposes only to indicate pass of a balise.</p> <p>Outputs are relay contacts</p> <p>If used the max. current shall externally be limited to 20mA and voltage to 24V+30%</p> <p>Shielded cable shall be used.</p>	/Installation manual/	Installation
AppRule_43	<p>UEBGEN5:</p> <p>Tuning of the antennas shall be done from the application.</p> <p>Tuning shall be done when:</p> <ul style="list-style-type: none"> - First usage of STM-DK - After all service and maintenance - By exchange of module. - By exchange of antenna. - By changing the cable connection - By moving the cables - When module is used in other cabinets - If the position of the antenna has changed. - Recommendation: Maintenance once each year. <p>The tuning shall take place at air temp. 15°C...40°C</p> <p>No metal including balises shall be near to the antenna's while tuning is active.</p>	/Installation manual/ /Maintenance Manual/	Installation Maintenance
AppRule_44	The Flash ROM on the data processing module, VE5A, must not be programmed while the STM carries responsibility for the safety of the train.	/SW instruction/	Production
AppRule_47	The user must confirm by tests that the PROFIBUS bandwidth used by the ZUB123-STM is compatible with the ETCS on-board equipment.	BDK design requirements for the EVC	EVC

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AppRule_48	The DK-STM shall be installed in a locked cabinet not accessible for travellers and service	/Installation manual/	Installation
AppRule_49	The cabinet for the DK-STM shall correspond to IP54 in EN60529	/Installation manual/	Installation
AppRule_51	Perform "sealing" of the DK-STM software due to the following reasons: <ul style="list-style-type: none"> - Prevent inadvertent writing in Flash memory from loading interface. - Prevent inadvertent changes of RAM contents from diagnosis commands. - Prevent read out of encrypted data. 	/SW instruction/	Production
AppRule_52	Short circuits between any conductors in the brake cables can compromise safety and shall be taken into consideration with respect to the wanted safety target	/Installation manual/	Installation
AppRule_53	Rule already fulfilled by the STM-DK rule: In Abhängigkeit der angegebenen Ausfallöffnungszeiten (AOZ) ist anwendungsspezifisch, unter Berücksichtigung des angestrebten Sicherheitsziels, die Abfallfähigkeit der Relais zu überprüfen (s. Kapitel 3.7.1 c) und 5.1.1 des Manuals). English translation: The ability of the relay to drop off must be supervised under consideration of the assigned hazard rate and taking account of the the stated error disclosure time.	/GASC/	GASC
AppRule_54	UNILINK interface. To be used with loading of DK-STM software rule: Auf der Frontplatte der CPU-Baugruppe ist eine /Lade-und Herstellerdiagnosedatenschnittstelle/ (UNILINK) ohne spezielle Schutzmaßnahmen vorhanden. Wird ein Diagnosegerät an einen unter Sicherheitsverantwortung laufenden TCC-Kern angeschlossen, muß zusätzlich im Diagnosegerät eine HW-Entkopplung vorgesehen werden, die eine ausfallbedingte gleichzeitige Rückwirkung auf den sicheren Rechner verhindert. English translation: A loading and manufacturer diagnostic interface is found on the front of the CPU module. If diagnosis equipment is connected to a TCC computer, which is performing safety relevant tasks, it must be ensured that the hardware connection prevents simulation impact on the safe computer. See rule 55	/Installation manual/ /SW instruction/	Installation Production
AppRule_55	UNILINK interface. To be used in special diagnostic cases. The data processing module, VEA5, has a diagnosis "UNILINK" interface on the front. External components must not be connected to the UNILINK interface while the ZUB123-STM carries responsibility for the safety of the train.	/Installation manual/ /SW instruction/	Installation Production
AppRule_56	TASSE5: Only to be used in special diagnostic cases. When using the diagnosis connection on the TASSE5 the PC shall be isolated from the train battery in accordance with EN50124-1 -basic isolation . The Ethernet connection at the Diagnosis PC must comply with this basic isolation. Tip: As a rule fulfilled by the laptop PS.	/Installation manual/ /Maintenance Manual/	Installation Maintenance

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AppRule_57	Software download on VE5A: The download tool must check if a software package exist (BUNDLE-BAB) with the name "Product". If this is the case the full software package must always be downloaded and programmed into the module. Optimized algorithms, which filter away unchanged data, are not allowed (delta download). If the above mentioned package is not found then the mode is "lab-mode". Delta download is only allowed in this mode. The person performing download must be sure that "lab-mode" is not used for download of safety relevant software.	/SW instruction/	Production
AppRule_58	The user must ensure that PROFIBUS node addresses and SAP numbers are unique in the entire system (/Subset-35) Id 14.5.1.9.)	BDK design requirements for the EVC	EVC
AppRule_61	If the STM CONTROL-Function connection is disconnected, the ETCS Onboard shall apply the safe action. The safe action shall be the emergency brake.	BDK design requirements for the EVC	EVC
AppRule_62	Only authorised staff may use the UNILINK interface for the provided online diagnostic facilities. After use of the UNILINK connection the DK-STM must be restarted.	/Installation manual/	Production
AppRule_63	Whether the Emergency brake is connected in parallel or in serial depends on train type. The brake shall be applied if the connection between these pins is open, it shall be released if the connection is closed.	/Installation manual/	Installation
AppRule_66	After receiving the state order HS (or DA, when HS is not used), the DK-STM uses 2s to activate the train antenna. With maximum speed of 200 km/h this means: The distance between the Transition Location and the first Zub123 Balise (danish ATC balise) shall be greater than 110 meter	BDK track engineering	Bdk
AppRule_67	The STM train specific data values are safety relevant. The ETCS Onboard shall implement a safe STM specific data entry procedure for data to the legacy ZUB123-STM software. The safety level for this ETCS function is SIL4. Safe data input from driver is to be realized by ETCS Onboard	BDK design requirements for the EVC	EVC
AppRule_70	Train data entered by Driver on the DMI shall be secured using proper data protection.	BDK design requirements for the EVC	EVC
AppRule_71	The DMI shall have a MTBF of at least 10000 hours	BDK design requirements for the EVC	EVC
AppRule_72	To maintain the SIL-level of 4 of the TCC platform, the DK-STM must not continuously be in state DA for more than 48h This is fulfilled by software. The Calculations are performed in the GASC	/GASC/	GASC
AppRule_74	Regarding storage and transport (as a component) of the DK-STM no higher demands as defined in EN60721-3-2 class 2M2 and 2K2 should be placed on the DK-STM.	/Installation manual/	Installation
AppRule_75	DK-STM is not responsible for the use of the emergency brake bypass function. The use of emergency brake bypass functionality shall be handled in the system safety case for the train.	ADSC train type	Installation
AppRule_77	Diagnosis interface: Standard EIA RS232 for connection of RS232 serial interface ser_02 must be followed	/Installation manual/	Installation
AppRule_79	For the emergency braking relay, a Hazard Rate contribution of $3,9 \cdot 10^{12}$ /hour must be used in a system safety case. This is not a requirement for the user. The calculations are performed in the GASC	/GASC/	GASC
AppRule_90	After the installation the correct functionality of the system STM-DK must be shown in a field test with the aspects speed measurement and receiving of track information, The train speed during the test must be up to 200 km/h including reading and treatment of balise pairs with a mutual distance of 21m.	BDK field test spec	Acceptance test
AppRule_97	After the installation the integration test on the vehicle must show that the connection ZUB123 STM does not disturb other Profibus participants.	/Installation manual/	Installation
AppRule_104	For STM to STM-Transitions, the ETCS Onboard shall follow the definitions of [SUBSET-035] including the definitions regarding STM TRIP situation (conditional CS order).	BDK design requirements for the EVC	EVC
AppRule_105	In case of a STM-STM-Transition, the ETCS Onboard shall follow the requirements of [SUBSET-035] regarding the "conditional cold standby".	BDK design requirements for the EVC	EVC

ID	Application rule	Documents for rule deployment	Fulfilment of rule
AppRule_108	The Clock used in ETCS Onboard must have the safety relevant THR=10-9/h or better.	BDK design requirements for the EVC	EVC
AppRule_110	General STM-DK conditions: Unless explicitly stated differently in the documentation it must be esured that no higher voltages that 60V can be applied to hardware interfaces of DK-STM even in case of failure of the connected equipment	/Installation manual/	Installation
AppRule_112	The fulfilment of the requirement for /HW_ProzessAnschaltung-PROFi5/ for products or equipment which makes use of the module PROFi5 must be shown by the relevant products or equipments. This is not a requirement for the user. The analysis is performed in the GASC	/GASC/	GASC
AppRule_174	Working procedures shall ensure reading out and noting down train type information after any access to the DK-STM maintenance menu during installation and maintenance work. This will prevent inadvertent changes to train type, which might be hazardous.	/Installation manual/ /Maintenance Manual/	Installation Maintenance