



**ERTMS/ETCS**

**FFFIS STM Test cases of Functional identity 009**

**FAILURE**

**Total: 9 Test cases**

REF : SUBSET-074-2-9

ISSUE : 4.0.0

DATE : 05/07/2023

Company	Technical Approval	Management approval
ALSTOM		
AZD		
CAF		
HITACHI RAIL STS		
MERMEC		
SIEMENS		
THALES		

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## Modification History

Issue Number Date	Section Number	Modification / Description	Author
0.0.1 16/12/2004	All	First version/review issued after WG meeting on the 15/12/2004 based on individual test diagram	Ansaldo FB
0.0.2 21/01/2005		Update according to Siemens comments, Add packet name for each packet number.	F. Bernaudin (Ansaldo)
0.0.3 26/01/2005		Update in Les Ulis meeting for all test case starting by 9b.2.0.1.0 to cover requirement 7.4.1.6.2.	F. Bernaudin (Ansaldo)
0.1.0 27/01/2005		Editorial changes for delivery	F. Bernaudin (Ansaldo)
1.0.0 13.10.2005		Editorial changes for delivery	Invensys Rail
1.0.1 07.07.2011	All	Update according to new release of SS035 and SRS B3	J. Sukup (AZD)
2.9.1 30.01.2013	All	Updated to be in line with Subset 35 issue 3.0.0 date 2010-02-29, SRS issue 3.3.0 date 2012-03-07 and ETCS DMI specification issue 3.3.0 date 2012-03-01	AZD J. Sukup
2.9.2 30.08.2013	All	Updated according to comments from 2nd internal review	AZD J. Sukup
2.9.3 2013-10-31	Diagrams, delays table, Headers of test case 9b2, 9b3, 9c2, 9e1	Updated according to CR 1158 (considering impact from CR 1173 and STMWG comments)	AZD J.Sukup
2.9.4 2014-02-28	No change	No change to this part of the Subset	Thomas Mandry (Alstom)
2.9.5 2014-04-24	Front page	Baseline 3 1 <sup>st</sup> Maintenance pre-release version	Thomas Mandry (Alstom)
3.0.0 2014-05-09	-	Baseline 3 1 <sup>st</sup> Maintenance release version	Philippe Prieels
3.0.1 2015-08-17	No change to this part of the Subset	CR 1278: impact from CRs 1094 & 1242 and from STMWP review	Thomas Mandry (Alstom)
3.0.2 2015-10-19	No change to this part of the Subset	CR 1278: Updated according to SUBSET-074v301ERAreview	Thomas Mandry (Alstom)

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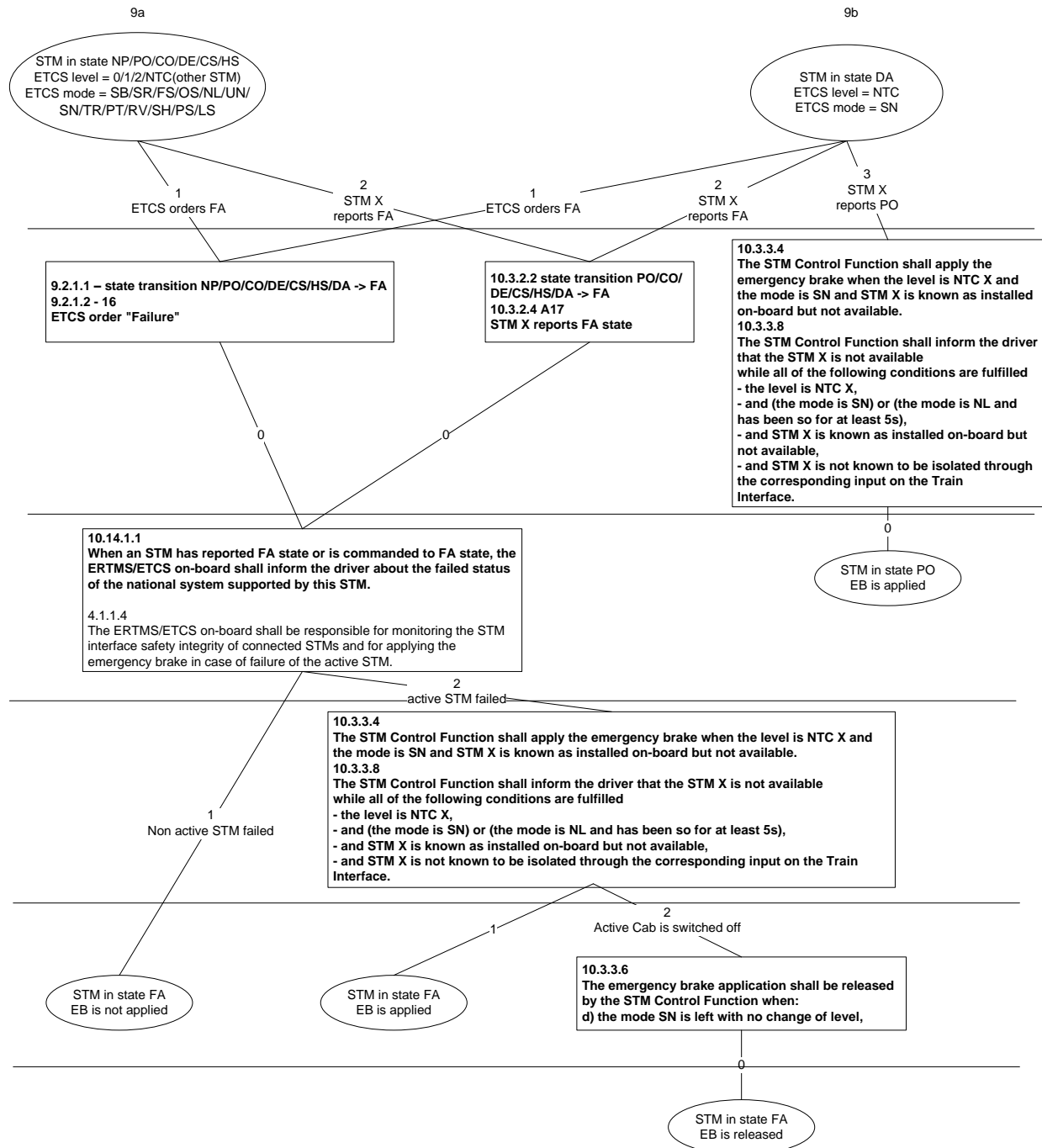
3.1.0 2015-12-16	-	Baseline 3 2 <sup>nd</sup> release version	Thomas Mandry (Alstom)
Version 3.1.1 2022-09-29	Front page Test cases	Update of company list CR1342: "Level 2" changed to "Level R"	Thomas Mandry (Alstom)
Version 3.9.1 25/11/22	-	Formal update for the 2 <sup>nd</sup> consolidation review for Baseline 4 1 <sup>st</sup> release version	Sven Adomeit (Siemens)
Version 3.9.2 2023-02-16	-	Formal update for the 3 <sup>rd</sup> consolidation review for Baseline 4 1 <sup>st</sup> release version	Thomas Mandry (Alstom)
Version 3.9.4 2023-06-20	Test cases	CR1342: "Level R" changed to "Level 2" (change cancellation) Formal update for the 4 <sup>th</sup> consolidation review for Baseline 4 1 <sup>st</sup> release version	Thomas Mandry (Alstom)
Version 4.0.0 05/07/2023	-	Baseline 4 1 <sup>st</sup> release version	Thomas Mandry (Alstom)

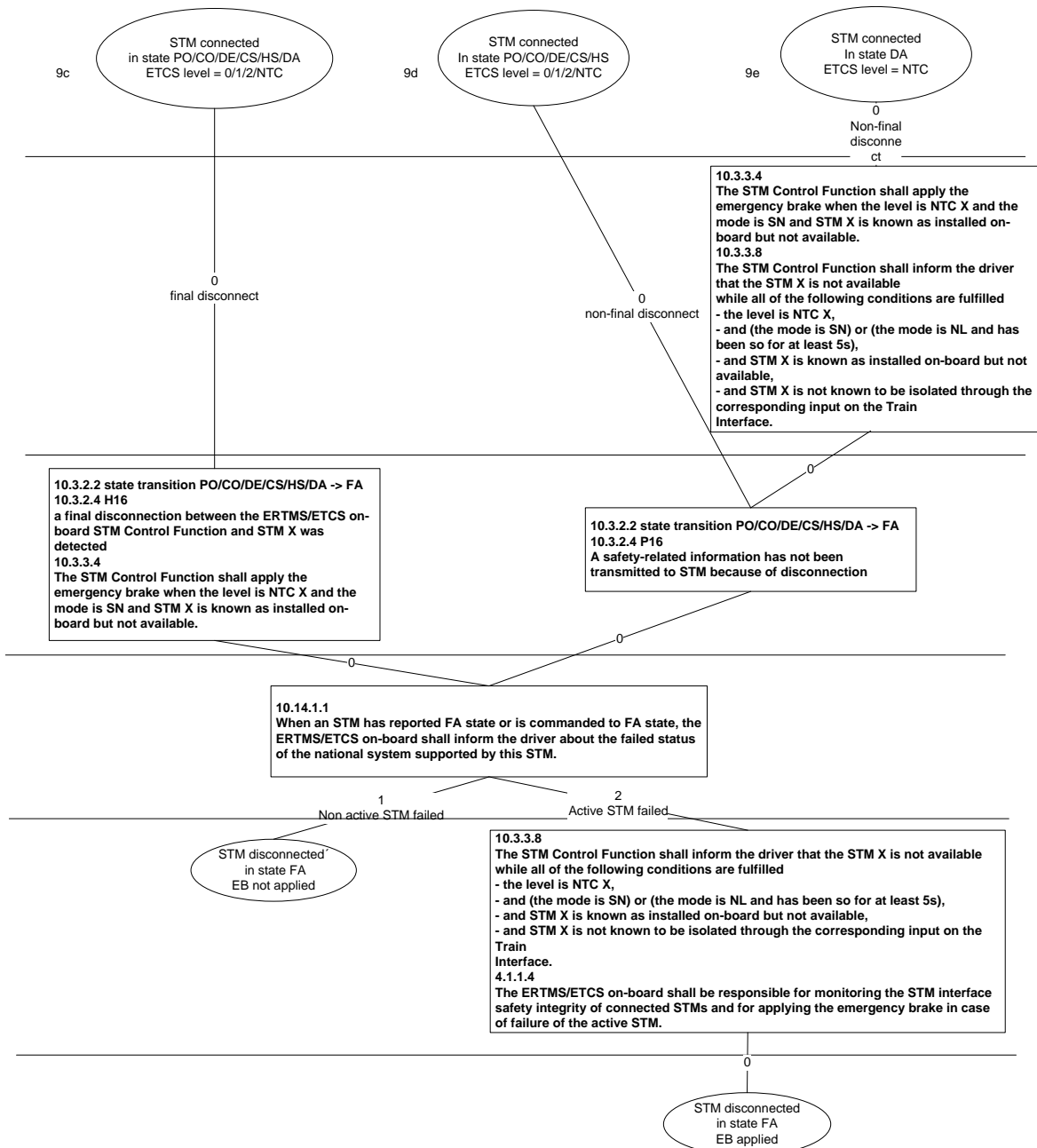


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## Diagrams







## Supplier-specific delays table

#	Supplier of	Start time	End time
Ts0	ETCS	Time-stamp of message including STM-15 with state report FA or time-stamp of disconnect telegram	A message about failed STM is displayed on DMI
Ts1	ETCS	Condition to release brake is fulfilled	Brakes are released
Ts2	ETCS	Connection with STM is lost (final or non-final disconnect received) or STM reports PO state or STM reports FA state	A message about STM not available is displayed on DMI
Ts3	ETCS	Information about change of some safety – relevant information is received (e.g. change of adhesion factor is set on DMI)	A message about failed STM is displayed on DMI
Ts4	ETCS	Text message about failed STM is acknowledged by driver	Information about STM not available is displayed on DMI



## Test case 9a.1

TEST CASE HEADER	
Test case identification	Failure
	9a.1.0.1
	ETCS orders FA to STM in states PO/CO/DE/CS/HS and STM reports FA state to the ETCS.
ERTMS/ETCS on-board requirements tested	Subset-035 :
	Subset-026 :
STM requirements tested	Subset-035 : 9.2.1.1 (transitions from PO/CO/DE/CS/HS to FA); 9.2.1.2 (16);
	Subset-026 :
Packets transmitted via FFFIS STM	Packet STM-14, STM-15
ERTMS/ETCS on-board configuration	
Comments and constraints	





Starting Conditions	Value	Comments
STM State	PO/CO/DE/CS/HS	All values shall be tested
ETCS Mode	SB/SR/FS/OS/NL/SL/UN/SN/TR /PT/RV/SH/PS/LS	Select a suitable set of combinations of mode and level where every mode and level should be tested in at least one test-case
ETCS Level	0/1/2/NTC	Select a suitable set of combinations of mode and level where every mode and level should be tested in at least one test-case, when NTC is used other STM Y is active
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	

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Starting Conditions	Value	Comments
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Not applicable

## STM Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The ETCS Order "Failure" and STM reports state	PROF	T0	STM Control Connection: Message-1 - ( Packet STM_14 - State order to STM)	PROF	10s	STM Control Connection: Message 2 – (Packet: STM_15 - State report from STM) The STM is in FA state

Message-1: ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the addressed STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	14	Packet identifier ( STM-14 - State order to STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	8	STM State order FA
PADDING BITS	COMPUTED	NOT RELEVANT	



Message-2: STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the sending STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	15	Packet identifier (STM-15 - State report from STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	8	state FA
PADDING BITS	COMPUTED	NOT RELEVANT	

End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	

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TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	

## Test case 9a.2

TEST CASE HEADER	
Test case identification	Failure
	9a.2.0.1
	STM in PO/CO/DE/CS/HS state reports FA state to the ETCS, then ETCS reports the FA state to the driver and ETCS does not brake as the STM is non active.
ERTMS/ETCS on-board requirements tested	Subset-035 : 10.3.2.2 (PO/CO/DE/CS/HS -> FA); 10.3.2.4 (A17); 10.14.1.1 Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	Packet STM-15
ERTMS/ETCS on-board configuration	
Comments and constraints	

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Starting Conditions	Value	Comments
STM State	PO/CO/DE/CS/HS	All values shall be tested
ETCS Mode	SB/SR/FS/OS/NL/UN/SN/TR/PT /RV/SH/PS/LS	Select a suitable value
ETCS Level	0/1/2/NTC	Select a suitable value, when NTC is used other STM Y is active
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM report FA state, ETCS displays failure info on DMI	PROF	T0	STM Control Connection: Message-1 (Packet STM-15 - State report from STM)	DMI	Ts0	A message about the failed STM is displayed on ETCS DMI
-	No brake is applied because non active STM failed	-	-		TIU	5s	The ETCS does not Brake

## STM Test case

Not applicable

Message-1: STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the sending STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	15	Packet identifier (STM-15 - State report from STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	8	state FA
PADDING BITS	COMPUTED	NOT RELEVANT	



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	





## Test case 9b.1

TEST CASE HEADER	
Test case identification	Failure
	9b.1.0.2.1
	ETCS orders FA to STM in state DA and STM reports FA state to the ETCS.
ERTMS/ETCS on-board requirements tested	Subset-035 :
	Subset-026 :
STM requirements tested	Subset-035 : 9.2.1.1 (transition from DA to FA); 9.2.1.2 (16);
	Subset-026 :
Packets transmitted via FFFIS STM	Packet STM-14, STM-15
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Not applicable

## STM Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The ETCS Order "Failure" and STM reports state	PROF	T0	STM Control Connection: Message-1 - ( Packet STM_14 - State order to STM)	PROF	10s	STM Control Connection: Message 2 – (Packet: STM_15 - State report from STM) The STM is in FA state

Message-1: ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the addressed STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	14	Packet identifier ( STM-14 - State order to STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	8	STM State order FA
PADDING BITS	COMPUTED	NOT RELEVANT	



Message-2: STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the sending STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	15	Packet identifier (STM-15 - State report from STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	8	state FA
PADDING BITS	COMPUTED	NOT RELEVANT	

End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	

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TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## Test case 9b.2

TEST CASE HEADER	
Test case identification	Failure
	9b.2.0.2.2.0
	STM in DA state reports FA state to the ETCS, then ETCS reports the FA state to the driver and ETCS applies brake as the STM is active. ETCS release brake as the train is stopped and active cab is switched off.
ERTMS/ETCS on-board requirements tested	Subset-035 : 10.3.2.2 (DA -> FA); 10.3.2.4 (A17); 10.3.3.4; 10.3.3.6 d); 10.3.3.8; 10.14.1.1 Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	Packet STM-15
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Moving	Speed is 18 km/h
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Established	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM reports FA state, ETCS displays failure info on DMI	PROF	T0	STM Control Connection: Message-1 (Packet STM_15 - State report from STM)	DMI	Ts0	A messages about the failed STM is displayed on ETCS DMI
-	Brake is applied because active STM failed	-	-	-	TIU	5s	The ETCS applies brake time T1
2	Deceleration until standstill	ODO	T2=T1+5s	Train decelerates from 18 km/h (deceleration of 1m/s <sup>2</sup> up to standstill)	-	-	-
3	Driver acknowledges failed STM information and information about not available STM is displayed.	DMI	T3 = T0+10s	Ack by driver	DMI	Ts4	A message about STM not available is displayed on ETCS DMI
4	Cab switch is switched off and brakes are released	TIU	T4=T3+5s	Cab switch is switched off	TIU	Ts1	The ETCS releases brake

## STM Test Case

Not applicable





Message-1: STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the sending STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	15	Packet identifier (STM-15 - State report from STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	8	state FA
PADDING BITS	COMPUTED	NOT RELEVANT	

End Conditions	Value	Comments
STM State	FA	
ETCS Mode	SB	
ETCS Level	NTC	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	

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TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	No cab active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



### Test case 9b.3

TEST CASE HEADER	
Test case identification	Failure
	9b.3.0
	STM in DA state reports PO state to the ETCS, then ETCS applies brake.
ERTMS/ETCS on-board requirements tested	Subset-035 : 10.3.3.4; 10.3.3.8  Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	Packet STM-15
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM reports PO state, ETCS applies brake	PROF	T0	STM Control Connection: Message-1 (Packet STM_15 - State report from STM)	TIU	5s	The ETCS applies brake
-	Information about not available STM is displayed.	-	-	-	DMI	Ts2	A message about STM not available is displayed on ETCS DMI

## STM Test Case

Not applicable

Message-1: STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	NID_STM of the sending STM
L_MESSAGE	8	COMPUTED	message length
NID_PACKET	8	15	Packet identifier (STM-15 - State report from STM)
L_PACKET	13	COMPUTED	packet length
NID_STMSTATE	4	1	state PO
PADDING BITS	COMPUTED	NOT RELEVANT	



End Conditions	Value	Comments
STM State	PO	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## Test case 9c.1

TEST CASE HEADER	
Test case identification	Failure
	9c.0.0.1
	STM in PO/CO/DE/CS/HS makes final disconnection, then ETCS reports the FA state of STM to the driver and ETCS does not brake as the STM is non active.
ERTMS/ETCS on-board requirements tested	Subset-035 : 10.3.2.2 (PO/CO/DE/CS/HS -> FA); 10.3.2.4 (H16); 10.14.1.1 Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	PO/CO/DE/CS/HS	All values shall be tested
ETCS Mode	SB/SR/FS/OS/NL/UN/SN/TR/PT /RV/SH/PS/LS	Select a suitable value
ETCS Level	0/1/2/NTC	Select a suitable value, when NTC is used other STM Y is active
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	





#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM sends valid final disconnect message according to Subset 057	PROF	T0	Valid final disconnect message according to Subset 057	DMI	Ts0	A message about the failed STM is displayed on ETCS DMI
-	No brake is applied because non active STM failed	-	-		TIU	5s	The ETCS does not Brake

#### STM Test Case

Not applicable



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	

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## Test case 9c.2

TEST CASE HEADER	
Test case identification	Failure
	9c.0.0.2.0
	STM in DA makes final disconnection, then ETCS reports the FA state of STM to the driver and ETCS applies brake as the STM is active.
ERTMS/ETCS on-board requirements tested	Subset-035 : 4.1.1.4; 10.3.2.2 (DA -> FA); 10.3.2.4 (H16); 10.3.3.4; 10.3.3.8; 10.14.1.1 Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM sends valid final disconnect message according to Subset 057	PROF	T0	Valid final disconnect message according to Subset 057	DMI	Ts0	A message about the failed STM is displayed on ETCS DMI
-	Brake is applied because active STM failed	-	-	-	TIU	5s	The ETCS applies brake
2	Driver acknowledges failed STM information and information about not available STM is displayed.	DMI	T1 = T0+10s	Ack by driver	DMI	Ts4	A message about STM not available is displayed on ETCS DMI

## STM Test Case

Not applicable



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## Test case 9d.1

TEST CASE HEADER	
Test case identification	Failure
	9d.0.0.1
	STM in PO/CO/DE/CS/HS makes non-final disconnection, then safety relevant information is changed. ETCS reports the FA state of STM to the driver and ETCS does not brake as the STM is non active.
ERTMS/ETCS on-board requirements tested	Subset-035 : 10.3.2.2 (PO/CO/DE/CS/HS -> FA); 10.3.2.4 (P16); 10.14.1.1 Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	PO/CO/DE/CS/HS	All values shall be tested
ETCS Mode	SB/SR/FS/OS/NL/UN/SN/TR/PT /RV/SH/PS/LS	Select a suitable value
ETCS Level	0/1/2/NTC	Select a suitable value, when NTC is used other STM Y is active
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	





#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM sends valid Non-Final disconnect telegram according to Subset 057	PROF	T0	Valid Non-Final disconnect message according to Subset 057 is sent	-	-	-
2	Driver changes Adhesion factor to slippery rail on DMI, STM is now in FA	DMI	T1=T0+5s	Driver changes adhesion factor to slippery rail.	DMI	Ts3	A message about the failed STM is displayed on ETCS DMI Time: T2
-	No brake is applied because non active STM failed	-	-		TIU	T2 + 5s	The ETCS does not Brake

#### STM Test Case

Not applicable



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## Test case 9e.1

TEST CASE HEADER	
Test case identification	Failure
	9e.0.0.0.2.0
	STM in DA makes non-final disconnection, then safety relevant information in EVC is changed and cannot be reported to disconnected STM. The ETCS reports the FA state of STM to the driver. ETCS applies brake as the STM is active.
ERTMS/ETCS on-board requirements tested	Subset-035 : 4.1.1.4; 10.3.2.2 (DA -> FA); 10.3.2.4 (P16); 10.3.3.4; 10.3.3.8; 10.14.1.1 Subset-026 :
STM requirements tested	Subset-035: Subset-026 :
Packets transmitted via FFFIS STM	
ERTMS/ETCS on-board configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Cab A active/Cab B active	Select a suitable value
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



## ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM sends valid Non-Final disconnect message according to Subset 057, brake is applied because active STM has disconnected.	PROF	T0	Valid Non-Final disconnect message according to Subset 057	TIU	5s	The ETCS applies brake
-	Information about not available STM is displayed.	-	-	-	DMI	Ts2	A message about STM not available is displayed on ETCS DMI
2	Driver changes Adhesion factor to slippery rail on DMI, STM is now in FA	DMI	$T1 = T0 + 1s + \max(5s, Ts2)$	Driver changes adhesion factor to slippery rail.	DMI	Ts3	A message about the failed STM is displayed on ETCS DMI

## STM Test Case

Not applicable



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
Other connections	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	