



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



INVESTIGATING REPORT

on the fire occurred on the 25th of May 2011, on the range of CF Constanta Regional Branch, between the railway stations CFR Navodari – Constanta Marfuri, at the locomotive DA 60 – 1528 (belonging to SC Grup Feroviar Roman SA Bucharest) in the composition of the train no. 79156



Final edition
the 11th of October 2011

NOTICE

With reference to the railway accident occurred on the 25th of May 2011, at 3:40a.m., in the running of the locomotive DA 1528 (belonging to SC Grup Feroviar Roman SA Bucharest) in the composition of the train no. 79156 (composed of the locomotive DA 1528 in head and DA 1562 towed), consisting of a fire in the engines box, in the area associated to the electric traction engines no. 2 and no. 3, on the running section Capu Midia – Palas, between the railway stations CFR Navodari - Constanta Marfuri (km. 16+500), Romanian Railway Investigating Body carried out an investigation according to the provisions of the Government Decision no. 117/2010. Through the investigation, the information on the respective accident was gathered and analyzed, the conditions were established and the causes determined.

Romanian Railway Investigating Body investigation did not aim to establish the guilty or the responsibility in this situation.

Romanian Railway Investigating Body considers necessary to take corrective measures in order to improve the railway safety and to prevent the accidents, so it included in the report a series of safety recommendations.

Bucharest, the 11th of October 2011

Approved by
Dragoş FLOROIU
Director

I agree the compliance with the legal provisions
on the investigation performance and
drawing up of this Investigation
Report, that **I submit for approval**

Chief Investigator
Nicu PĂLĂNGEANU

This approval is part of the Report for the investigation of the accident occurred on the 25th of May 2011, on the range of activity of CF Constanta Regional Branch, the running section Capu Midia – Palas, between the railway stations CFR Navodari – Constanta Marfuri (km. 16+500) in the running of the train no. 79156 belonging to SC Grup Feroviar Roman SA, consisting of a fire at the locomotive DA 60-1528.

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I. PREAMBLE

I.1. Introduction

The fire occurred on the 25th of May 2011, at 3:40a.m., in the running of the train no. 79156, at the locomotive DA 60-1528-3 (structural subsystem – railway vehicle) is an accident that qualifies at the art. 7, paragraph (1), letter (e) of the **Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety**, approved by Government Decision no. 117/2010 hereinafter referred as “**Regulations**” in the investigation report.

Taking into account those above mentioned and according to the art. 19, paragraph (2) from the *Law no. 55/2006 on the railway safety*, corroborated with the art. 48, paragraph (1) of the **Regulations**, an investigation commission was appointed by Romanian Railway Investigating Body.

Through the investigation, the information on the respective accident was gathered and analyzed, the conditions were established and the causes determined.

Romanian Railway Investigating Body investigation did not aim to establish the guilty or the responsibility in this situation.

I.2. Investigation process

Immediately after the accident, Romanian Railway Investigating Body was notified verbally and in written about it by the Traffic Safety Regional Inspectorate of Constanta in CNCF “CFR” SA.

After moving to the place of the accident, it observed:

- the locomotive DA-60-1528-3, that ran from the railway station CFR Capu Midia as train no. 79156 (with the destination at the railway station CFR Constanta Marfuri), followed by the locomotive DA - 1562, was stopped in current line at the km. 16+500, between the railway stations Navodari – Constanta Marfuri;
- in the driving station no. 1, all the installations were in normal condition, without signs of thermal effect during the fire;
- in the driving station no. 2, all the installations were in normal condition, without signs of thermal effect during the fire;
- the relays panel and the automatic fuses block on the devices block, unaffected thermally, with deposits of soot;
- at the auxiliary generator, the brush holder crown in the bottom area and the stator coils insulation were thermally affected;
- the power wiring from the main generator terminals had the insulation charred on the area between the generator terminals and the entry in the wiring channel;
- conductors in the terminals boxes from the electric traction engines no.2 and no.3 and the connecting conductors between the terminals boxes and the entry in the wiring channel had the insulation burnt;
- the line and the installations in the area of the accident were not affected.

No deaths and injuries.

At the accident place were present the representatives of:

- Romanian Railway Investigating Body;
- Romanian Railway Safety Authority;
- SC Grup Feroviar Roman SA Bucharest.

Through the Decision no. 59 from the 25th of May 2011 of the OIFR Director, according to the provisions of the art. 19, paragraph (2) of the *Law no. 55/2006 on the railway safety*, corroborated with the art. 48(1) of the **Regulations**, the investigation commission was appointed, consisting of:

- Cristian Bobe - Head of IAFG –OIFR - main investigator
- Barbu Marcel - territorial state inspector ISF Constanta - member
- Raduță Alexandru – special inspector T SC GFR SA - member
- Mihai Daniel - Head of locomotives repair office SC GFR SA - member.

A. BRIEF PRESENTATION OF THE ACCIDENT

A.1. Brief presentation

On the 25th of May 2011, at 3:40a.m., the locomotive DA 1528 (belonging to SC Grup Feroviar Roman SA Bucharest) was running in the composition of the train no. 79156 (composed of the locomotive DA 1528 in head and DA 1562 towed) on the running section Capu Midia – Palas, between the railway stations CFR Navodari - Constanta Marfuri (km. 16+500), being driven/served in complete team.

From the railway station CFR Capu Midia the train no. 79156 left at 1:55a.m. and ran up to the railway station Navodari where it stopped at 2:23a.m.

In the railway station CFR Navodari the train stationed 26 minutes and the locomotive driver and the driver assistant performed the locomotive inspection in the engines box and also outside it and there were not found irregularities in the operation of the diesel engine or of the electric installations.

At 2:49a.m. the train no. 79156 was sent from the railway station CFR Navodari towards the railway station CFR Constanta Marfuri and at the exit from the railway station CFR Navodari, the driver assistant performed a total inspection in the engines box and came back to the driving station reporting to the locomotive driver that the diesel engine and the electric installations work normally.

After leaving from the railway station CFR Navodari, after running a distance of about 3 kilometers, starting from the km. 11+216 the train entered the speed limit of 30 Km/h between the railway stations CFR Navodari and Constanta Marfuri, the real running speed of the train being lower to the speed of 30 km/h.

On the area of the speed limit, at the km. 14+762, while the locomotive controller was in position 2(two), the locomotive driver found the lightening of the indicator “Optical call, grounding”, reason for which he asked the driver assistant to enter in the engines box to find the cause. After entering the engines box the driver assistant found a smoke release in the area of the auxiliary generator and of the electric traction engines no. 2 and no. 3, which communicated to the locomotive driver who took action to rapid stop the train and insure the locomotive against moving. Then the locomotive staff isolated the diesel ramp and disconnected the locomotive acting the switch no. 8.

To eliminate the smoke release, the locomotive staff driving/serving the locomotive DA 1528 together with the locomotive driver who was assisting the locomotive DA 1562 running in towed condition, acted the fire extinguishers in the area associated to the auxiliary generator and to the electric traction engines no. 2 and no. 3.

As the smoke release persisted, the locomotive driver announced the traffic operator and asked for the specialized intervention of the firemen by calling 112.

Given that the locomotive was stopped on the bridge over the canal Danube - Navodari – Midia, the drivers of the two locomotives decided to withdraw the locomotive from the bridge in an area easier to access for the firemen intervention, continuing to act with the fire extinguishers and the water in the cooling installation of the diesel engine, managing to localize the smoke release, so that at the firemen formation arrival the fire had been almost extinguished.

After the fire extinguishment and take of protection measures to ensure the further security, at 5:25 a.m. the locomotive was directed in towed condition with the locomotive DA 1562, from the km. 14+762 from current line to the railway station CFR Constanta Marfuri, where arrived at 6:24a.m., then being shed in the section IRLU Palas at 6:30 a.m.

A.2. Causes of the accident

A.2.1. Direct cause

Occurrence of a short-circuit between the supply cables A and E of the traction engine no. 3 as a consequence of piercing the insulation in the contact area between the two cables, which led to the appearance of a top of intensity of the supply current of the engine, followed by the welding of the metallic part of the two cables and the ignition of the insulation of the other cables associated to the electric traction engine no. 3 and by influence of the supply cables of the electric traction engine no. 2.

Contributing factors

Piercing of the insulation occurred as consequence of the mechanic wear in the contact area of the supply cables insulation of the electric traction engine A (rotor connection) and E (stator connection).

A.2.2. Underlying causes

None.

A.2.3. Root causes

None.

A.3. Severity level of the accidents

According to the provisions of the **Regulations**, the event is categorized as accident, in accordance with the art. 7, paragraph (1), letter e.

A.4. Safety recommendations

The recommendation aim to solve the next issue:

1. Identifying and implementing solutions to ensure protection of the supply cables of the electric engines against the mechanic wears in the contact area between them.

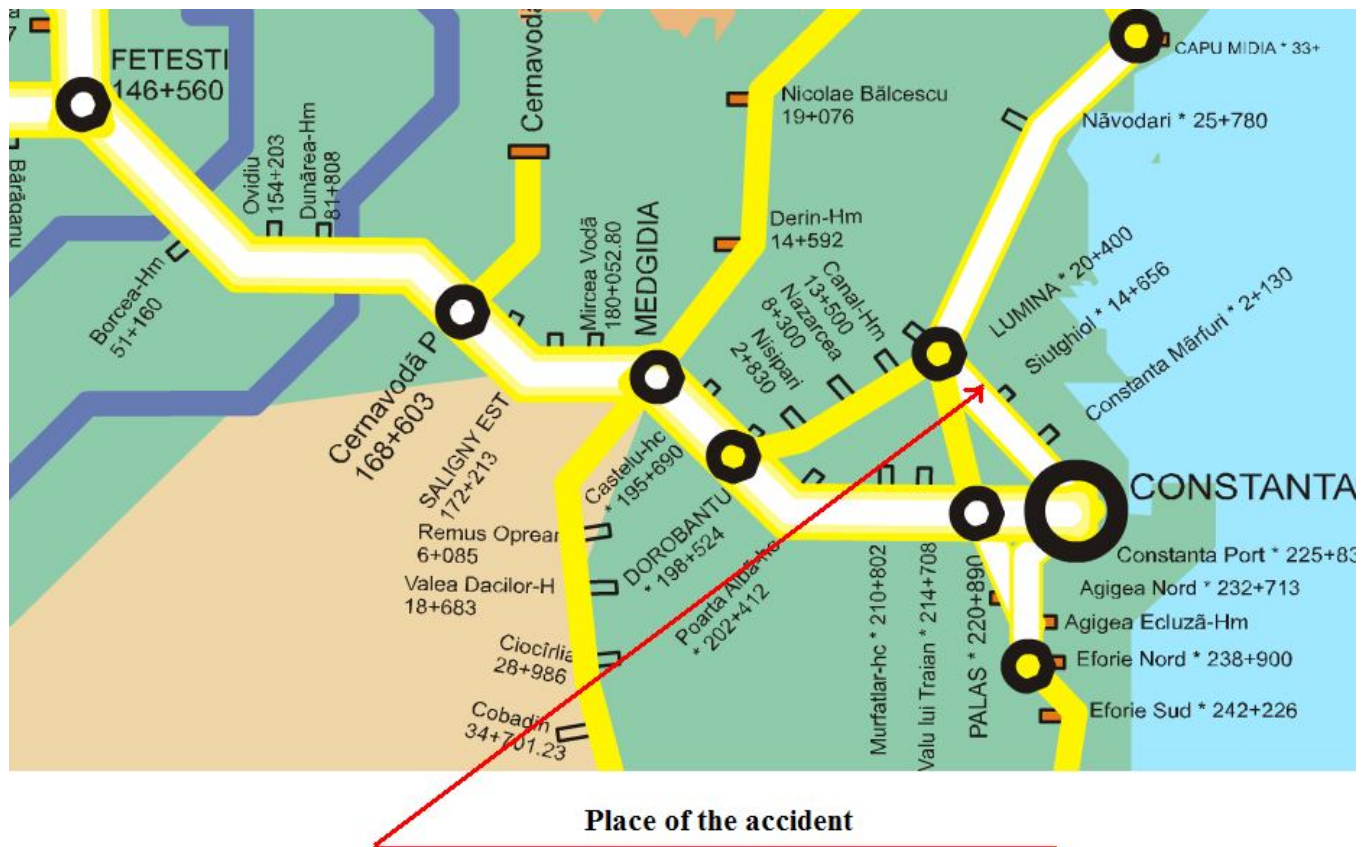
The addressees of the safety recommendations are: Romanian Railway Safety Authority and SC Grup Feroviar Roman SA Bucharest.

This investigation report will be sent to Romanian Railway Safety Authority, to SC Grup Feroviar Roman SA and to the Regional Center of Operation, Maintenance and Repairs Constanta Branch.

B. INVESTIGATING REPORT

B.1. Description of the accident

On the 25th of May 2011, the train no. 79156, composed of the locomotive DA 1528 in head (driven/served in complete team belonging to SC Grup Feroviar Roman SA Bucharest) and DA 1562 towed (served by locomotive driver belonging to SC Grup Feroviar Roman SA Bucharest) was running on the running section Capu Midia – Palas, between the railway stations CFR Navodari - Constanta Marfuri (km. 16+500).



From the railway station CFR Capu Midia the train no. 79156 left at 1:55a.m. and ran up to the railway station Navodari where it stopped at 2:23a.m. In the railway station CFR Navodari the locomotive driver and the driver assistant performed the locomotive inspection in the engines box and also outside the locomotive and there were not found irregularities in the operation of the diesel engine or of the electric installations. After stationing 26 minutes, at 2:49 a.m. the train left from the railway station Navodari.

At the exit from the railway station CFR Navodari, the driver assistant performed a total inspection in the engines box and coming back to the driving station he reported to the locomotive driver that the diesel engine and the electric installations were working normally.

After leaving from the railway station CFR Navodari, after running a distance of about 3 kilometers, starting from the km. 11+216 the train entered the speed limit of 30 Km/h between the railway stations CFR Navodari and Constanta Marfuri, the real running speed of the train being lower to the speed of 30 km/h.

On the area of the speed limit, at the km. 14+762, while the locomotive controller was in position 2(two), the locomotive driver found the lightening of the indicator “Optical call, grounding”, reason for which he asked the driver assistant to enter in the engines box to find the cause. After entering the engines box the driver assistant found a smoke release in the area of the auxiliary generator and of the electric traction engines no. 2 and no. 3, which communicated to the locomotive driver who took action to rapid stop the train and insure the locomotive against moving. Then the locomotive staff isolated the diesel ramp and disconnected the locomotive acting the switch no. 8.

To eliminate the smoke release, the locomotive staff driving/serving the locomotive DA 1528 together with the locomotive driver who was assisting the locomotive DA 1562 running in towed condition, acted the fire extinguishers in the area associated to the auxiliary generator and to the electric traction engines no. 2 and no. 3.

As the smoke release persisted, the locomotive driver announced the traffic operator and asked for the specialized intervention of the firemen by calling 112.

Given that the locomotive was stopped on the bridge over the canal Danube - Navodari – Midia, the drivers of the two locomotives decided to withdraw the locomotive from the bridge in an area easier to access for the firemen intervention, continuing to act with the fire extinguishers and the water in the cooling installation of the diesel engine, managing to localize the smoke release, so that at the firemen formation arrival the fire had been almost extinguished.

After the fire extinguishment and take of protection measures to ensure the further security, at 5:25 a.m. the locomotive was directed in towed condition with the locomotive DA 1562, from the km. 14+762 from current line to the railway station CFR Constanta Marfuri, where arrived at 6:24a.m., then being shed in the section IRLU Palas at 6:30 a.m.

There were no deaths or injuries.

The intervention plan of the rescue and emergency services

Given that the locomotive was stopped on the bridge over the canal Danube - Navodari – Midia, to facilitate the intervention of specialized forces in the Inspectorate for Emergency Situations, the two locomotives were withdraw from the bridge in an area easier to be accessed.

On spot came the Fire brigade Constanta Town from the Inspectorate for Emergency Situations “Dobrogea” of Constanta County.

B.2. The accident circumstances

B.2.1. Involved parties

2.1.1 The locomotive DA 60 - 1528 - 3 is the property of SC Grup Feroviar Roman SA Bucharest and is maintained by the staff of the Section IRLU Palas in SC Locomotives and Equipment Maintenance and Repairs CFR “IRLU” SA.

The staff that drove/served the locomotives belongs to SC Grup Feroviar Roman SA Bucharest.

2.1.2 The railway infrastructure on which the accident occurred is managed by SC Grup Feroviar Roman SA Bucharest and is maintained by its own staff.

2.1.3 Installations signaling, centralization and blocking (SCB) between the railway stations Capu Midia and Constanta Marfuri are managed by SC Grup Feroviar Roman SA and maintained by its own staff.

2.1.4 The installation of railway communications on the involved locomotive is the property of SC Grup Feroviar Roman SA and is maintained by the staff of the Section IRLU Palas.

B.2.2. Forming and equipments of the train

The train no. 79156 was composed of the locomotive DA 1528 in head (driven/served by complete team belonging to SC Grup Feroviar Roman SA Bucharest) and DA 1562 towed (served by locomotive driver belonging to SC Grup Feroviar Roman SA Bucharest).

The locomotive DA 1528 involved in the accident belongs to the railway undertaking SC Grup Feroviar Roman SA Bucharest.

The safety and vigilance equipments (DSV), the equipment for the point control of the speed and hitchhiking (INDUSI) of the locomotive were in working condition.

B.2.3. Railway equipments

The involved railway infrastructure, respectively the running line between Capu Midia and Constanta

Marfuri, is managed by SC Grup Feroviar Roman SA Bucharest and maintained by its own staff.

The line between the railway station Cap Midia and Constanta Marfuri, is not electrified and in the area of the kilometer 14+762 is in embankment, in alignment and gradient with slope of 2-3‰ in the running direction.

B.2.4. Means of communication

The connection between the locomotive staff and the movements inspectors was ensured through radio-telephone equipments.

B.3. Accident consequences

B.3.1. Death and injuries

None.

B.3.2. Material damages

Following the fire, damages and expenses incurred amounted to **18 405.13 lei**, detailed as follows:

- at the locomotive, according to the estimate of Section IRLU Palas, amounted to 18 405.13 lei;
- train delays, according to the note no. 6/5.1/213/2011 of Constanta Traffic Controller in CF Constanta Regional Branch, amounted to 0.00 lei ;
- at the lines – none;
- at the installations – none;
- at the environment – none.

B.3.3. Consequences of the accident in the railway traffic

None.

No train delays.

B.4. External circumstances

On the 2nd of May 2011, at the time of the railway accident the visibility was good, clear sky, no wind and the air temperature was of about 15⁰ C.

The line between the railway station Cap Midia and Constanta Marfuri, is not electrified and in the area of the kilometer 14+762 is in embankment, in alignment and gradient with slope of 2-3‰ in the running direction.

The visibility of the light signals was in accordance with the specific regulations in force.

B.5. Investigation course

B.5.1. The summary of the of the involved staff statements

B.5.1.1. The summary of the of the railway undertaking staff statements

The investigation commission questioned the employees involved in driving/serving the involved locomotive.

The locomotive driver who drove the locomotive DA 60- 1528-3, on the 25th of May 2011 stated as follows:

- normal driving conditions on the section Cap Midia - Navodari;
- after passing through the railway station Navodari, he notices the entry into action of the signaling indicator “Optical call” and he asked to the driver assistant to check the engines box;
- after checking, the driver assistant told him he had noticed smoke release in the engines box, in the area of the auxiliary generator and of the traction engines no. 2 and no. 3;
- he announced through RTF the traffic operator about this smoke release and they took immediate action to stop the train;

- after stopping the train and ensuring the locomotive against moving he intervened in the area of the auxiliary generator and of the traction engines 2 and 3 with the fire extinguishers to localize and eliminate the smoke release, announcing also the firemen formation of Constanta city;
- he used together with the driver assistant the fire extinguishers in the equipment of the locomotive and then also the extinguishers from the second locomotive and also the water in the cooling installation of the diesel engine;
- the firemen arrived at the place of the accident around 3:40 a.m.

The driver assistant on the locomotive DA 1528, stated as follows:

- he served the locomotive DA 1528 on the section Capu Midia - Navodari on which it ran isolated as train no. 79156 being followed by the locomotive DA 1562;
- on the speed limit of 15 km/h, between the railway stations Navodari and Constanta Marfuri, is asked by the locomotive driver to perform an inspection in the engines box due to the lightning of the signaling indicator "Optical call";
- after performing the inspection in the engines box he announced the locomotive driver about the occurrence of a smoke release in the area of the auxiliary generator and of the traction engines 2 and 3;
- together with the locomotive driver he used the fire extinguishers in the equipment of the locomotive to eliminate the smoke release.

The locomotive driver who was driving the locomotive DA – 1562, following the locomotive DA 1528 on the 25th of May 2011, stated as follows:

- from the railway station Capu Midia and to the place of the accident he drove in normal conditions, without finding irregularities at the locomotive he was serving and at the locomotive in head;
- after the train exit from the railway station Navodari, at the km.14+762 he heard through RTF the locomotive driver in head DA 1528, when he announced he had problems at the locomotive by smoke release;
- after the train stop he took actions to ensure the locomotive against moving and with the fire extinguishers in the equipment of the locomotive DA 1562, he acted together with the staff of the locomotive DA 1528 to limit the smoke release to this locomotive;
- he acted to withdraw the locomotive from the bridge in an accessible area.

B.5.2. Safety management system

On the date of the accident, the railway undertaking SC Grup Feroviar Roman SA Bucharest, has established its own safety management system, having the safety certificate part A no. UE RO 1120100014 delivered by ASFR on the 6th of April 2010, valid until the 10th of April 2012.

B.5.3. Norms and regulations. Sources and references for the investigation

In the investigation of the railway accidents one took into account:

- minutes concluded by the commission on spot with reference to the condition of the rolling stock, lines and equipments.
- photos taken soon after the railway accident by the members of the investigation commission;
- railway norm "Railway vehicles. Inspections and planned repairs" no. 67-005 from 2008 approved by OMT no. 364/2008;
- statements of the teams on the locomotives;
- minutes concluded by the members of the investigation commission after the occurrence of the accident;
- documents on the locomotive maintenance and repair provided by the responsible with its maintenance;
- inspection and interpretation of the technical condition of the elements involved in the accident;
- documents of release of the train.

B.5.4. Work of the rolling stock

B.5.4.1. Data found on the locomotive DA 60-1528:

B.5.4.1.1. Data resulted from the checks performed on the 26th of May 2011 by the investigation commission and the maintenance and repair staff of the Section IRLU Palas and recorded in a minutes (part of the investigation file) and photos (taken by the investigation commission).

Following the checks performed by the investigation commission at the locomotive, one found out:

Outside of the locomotive:

- condition of the locomotive box: normal, without deformations, degradations or signs of thermal effects;
- bandages of the wheels: normal condition, without signs of thermal effect;
- shoes: normal condition, with technological wear level within the instructional limits, without signs of thermal effect;
- Brake wheelhouse: normal working condition, without signs of thermal effect;

The driving station I:

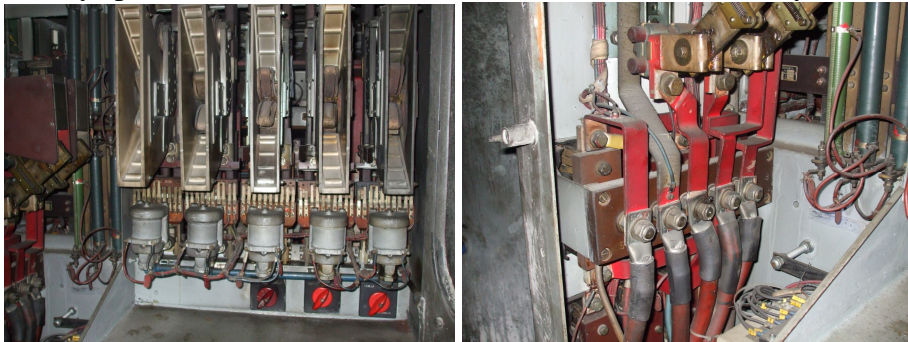
- all the installations in normal condition;
- side walls, window and ceiling have traces of soot;

The driving station II:

- all the installations in normal condition;

Engines box:

- relays panel, the automatic fuses block, unaffected thermally, have only deposits of soot;



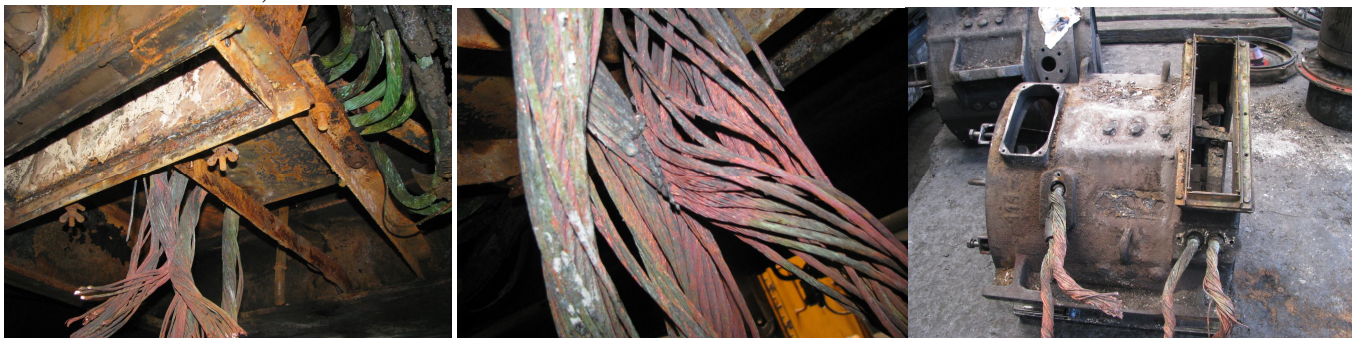
- the components of the auxiliary services, the fuel installation, the installation of oversupply of the diesel engine, the cooling installation do not have degradations or affectations by the thermal influence;
- the air filter on the side walls of the locomotive, in normal condition;
- the paint of the inner walls of the box and the paint of the diesel engine are not affected.

The electric traction engine no. 2:

- supply cables with the insulation partially charred in the fixing area of the terminals block on a distance of about 400-500 mm ;
- bellows of the ventilation channel, completely burnt;

The electric traction engine no. 3:

- supply cables had the insulation completely charred and completely displaced from the engine housing to the terminals box;



- cables A (rotor connection) and E (stator connection), welded at a distance of about 400-500 mm from the terminals box of the traction engine no. 3;

- bellows of the ventilation channel, completely burnt;



- winding rotor, stator and brush-holder crown in normal condition;
- stator and rotor insulation resistances of the electric traction engine no. 3, appropriate (100 Mohm).

The electric traction engines no. 1, no. 4, no. 5, no. 6, appropriate from the technical point of view, without thermal affectation.

The main generator and the auxiliary generator

- the bottom area of the brush-holder crown, thermally affected;
- stator coils insulation, thermally affected;
- the power wiring insulation charred on a distance of about 400 mm on the area between the generator terminals and the entry in the wiring channel.



Accumulator batteries

- the accumulator battery pack and the inside of the niches, the insulation of the flexible serial registration connection between the boxes did not have signs of short-circuit of thermal affectation;

Electric cables associated to the electric traction engines, after the fire:

- serial registration cables of the traction engine no. 1, in normal condition, unaffected thermally;
- serial registration cables of the traction engine no. 2, with the insulation partially charred on a distance of about 400-500 mm in the fixing area on the terminals board;
- serial registration cables of the traction engine no. 3, charred and completely displaced from the engine housing to the terminals box and the cables A (rotor connection) and E (stator connection), welded at a distance of about 400-500 mm from the terminals box of the traction engine no.3;



- serial registration cables of the traction engine no. 4, in normal condition, unaffected thermally;
- serial registration cables of the traction engine no. 5, in normal condition, unaffected thermally;
- serial registration cables of the traction engine no. 6, in normal condition, unaffected thermally.

B.5.4.1.2. Data resulted from the analysis of the documents asked from the railway undertaking

- the last inspection type “R1” was performed on the 26th of April 2011 at the Section IRLU Palas – Constanta ;
- the last inspection type PTAE was performed at the Section IRLU Palas, on the 23rd of May 2011;
- for the locomotive DA 60-1528-3 (old identification number DA 60-0195-2), there is a technical certificate series AT no. 152/2010 delivered by the Romanian Railway Authority – AFER until the 22nd of October 2013, as a result of continued operation after exceeding the normal operating and prolongation from 45 years to 49 years.
- the last repair type RR was performed on the 7th of January 2009 at the Section IRLU Pascani, occasion on which the power wiring of the electric traction engines was replaced;
- the electric traction engine MET 3 on the locomotive at the moment of the fire occurrence was mounted on the locomotive on the 13th of May 2009 at the Section IRLU Dej, from the reserves of the Section IRLU Pascani; the necessity of mounting on the locomotive this engine was because, during the warranty after the repair type RR performed on the 7th of January 2009 et the Section IRLU Pascani, the electric traction engine MET 3 has failed;
- during the investigation was not obtained data on the date of mounting the power wiring mounted on the electric traction engine MET 3 on the locomotive at the date of the fire occurrence;
- the locomotive DA 1528 will have the repair type RG in 2013.



B.6. Analysis and conclusions

B.6.1. Analysis of the fire occurrence

Following the occurrence of eventual wears in the contact area of the power wiring insulation of the electric traction engine A (rotor connection) and E (stator connection), and also the fund of eventual aging effect in time of these cables insulation, occurred the piercing of the insulation and a short-circuit between the two electric cables, which led to the ignition of the cables insulation associated to the electric traction engine no. 3, and also to the welding of the cables metallic part in an area placed at a distance of about 400-500 mm from the terminals box of the traction engine no. 3.

By burning of the serial registration cables of the electric traction engine no. 3 by influence were thermally affected the wiring insulation of the electric traction engine no. 2 and also the brush-holder crown (in the bottom area) and the stator coils insulation of the auxiliary generator.

At the same time was thermally affected the power wiring insulation, on the area between the terminals of the main generator and of its entry in the wiring channel, on a distance of about 400 mm.

Inside the wiring channel, the devices block, the power and control wiring had the insulation intact, without signs of short-circuit or thermal influence.

The metallic parts of the engine group diesel-generator had the paint intact, without distortions or degradations of the structural strength.

The electric traction engines, the electric machines associated to the auxiliary services, the supply and command wiring had no signs of short-circuit, cuts or local melting.
There were checked by dismantling the turbines and the housings of the forced ventilation of the electric traction engines and there were not found signs of friction generating sparks.

B.7. The accident causes

B.7.1. Direct cause

Occurrence of a short-circuit between the supply cables A and E of the traction engine no. 3 as a consequence of piercing the insulation in the contact area between the two cables, which led to the appearance of a top of intensity of the supply current of the engine, followed by the welding of the metallic part of the two cables and the ignition of the insulation of the other cables associated to the electric traction engine no. 3 and by influence of the supply cables of the electric traction engine no. 2.

Contributing factors

Piercing of the insulation occurred as consequence of the mechanic wear in the contact area of the supply cables insulation of the electric traction engine A (rotor connection) and E (stator connection).

B.7.2. Underlying causes

None.

B.7.3. Root causes

None.

C. Safety recommendations

The recommendation aim to solve the next issue:

1. Identifying and implementing solutions to ensure protection of the supply cables of the electric engines against the mechanic wears in the contact area between them.

The addressees of the safety recommendations are: Romanian Railway Safety Authority and SC Grup Feroviar Roman SA Bucharest.

This investigation report will be sent to Romanian Railway Safety Authority, to SC Grup Feroviar Roman SA and to the Regional Center of Operation, Maintenance and Repairs Constanta Branch.

Members of the investigation commission:

- | | | |
|--------------------|---|---------------------|
| • Cristian Bobe | - Head of IAFG –OIFR | - main investigator |
| • Barbu Marcel | - territorial state inspector ISF Constanta | - member |
| • Raduță Alexandru | - special inspector T SC GFR SA | - member |
| • Mihai Daniel | - Head of locomotives repair office SC GFR SA | - member |