

NOTICE

Concerning the railway accident happened on the 14th of February 2013, in the activity of the Branch of the Regional Center for Railway Operation, Maintenance and Repairs Galați between the railway stations Galați Brateș and Cătușa (non-electrified simple line), in current line, at km 3+480, in the running of the freight train no. 76052 (belonging to the freight railway undertaking SNTFM „CFR Marfă” SA) occurred a fire at the locomotive DA 67-1069-3, the Romanian Railway Investigating Body performed an investigation, according to the provisions of the Government Decision no. 117/2010. Through the performed investigation, the information concerning the occurrence of this accident were gathered and analyzed, the conditions were established and the causes determined.

Romanian Railway Investigating Body's investigation did not aim to establish the guilt or the responsibility in this case.

Romanian Railway Investigating Body did not identify safety recommendations, not considering necessary to take corrective measures for the improvement of the railway safety and the prevention of the accidents.

Bucharest, the 26th of April 2013

Approved by

Director,
Cristian Marius MOȘ

*I ascertain the compliance with the
legal provisions concerning the investigation
and the drawing up of this investigating report that*

I submit for approval

Chief Investigator

Eugen ISPAS

This notice is part of the Investigation Report of the railway accident happened on the 14th of February 2013, in the activity of the Branch of the Regional Center for Railway Operation, Maintenance and Repairs Galați between the railway stations Galați Brateș and Cătușa (non-electrified simple line), in current line, at km 3+480, in the running of the freight train no. 76052 (belonging to the railway undertaking SNTFM „CFR Marfă” SA) occurred a fire at the locomotive DA 67-1069-3.



INVESTIGATING REPORT

of the railway accident

occured on the 14th of February 2013, in the activity of the Branch of Regional Center for Railway Operation, Maintenance and Repairs Galați Galati, between the railway stations Galati Brateș and Cătușa, in the running of the freight train no. 76052



*Final edition
The 26th April 2013*

SUMMARY

A. PREAMBLE	4
<i>A.1. Introduction</i>	4
<i>A.2. Investigation process</i>	4
B. INVESTIGATION REPORT BRIEF PRESENTATION	4
<i>B.1. Brief description</i>	5
<i>B.2. Causes of accident occurrence</i>	5
<i>B.2.1. Direct cause, contributing factors</i>	5
<i>B.2.2. Underlying causes</i>	5
<i>B.2.3. Root causes</i>	5
<i>B.3. Severity grade</i>	5
<i>B.4. Safety recommendations</i>	5
C. INVESTIGATION REPORT	5
<i>C.1. Accident presentation</i>	5
<i>C.2. Accident circumstances</i>	8
<i>C.2.1. Involved parties</i>	8
<i>C.2.2. Composition and the equipments of the train</i>	8
<i>C.2.3. Presentation of the railway equipment involved in the railway accident</i>	8
<i>C.2.4. Communication means</i>	9
<i>C.2.5. Starting of the railway emergency plan</i>	9
<i>C.3. Accident consequences</i>	9
<i>C.3.1. Fatalities and injuries</i>	9
<i>C.3.2. Material damages</i>	9
<i>C.3.3. Consequences of the railway accident in the railway traffic</i>	9
<i>C.4. External circumstances</i>	9
<i>C.5. Investigation course</i>	10
<i>C.5.1. Summary of the involved staff testimonies</i>	10
<i>C.5.2. Safety management system</i>	11
<i>C.5.3. Norms and regulations. Sources and references for investigation</i>	11
<i>C.5.4. Operation of the technical equipments, infrastructure and rolling stock</i>	11
<i>C.5.4.1. Data on the installations</i>	11
<i>C.5.4.2. Data on the lines</i>	11
<i>C.5.4.3. Data on the operation of the rolling stock and its technical equipment</i>	12
<i>C.6. Analysis and conclusions</i>	14
<i>C.6.1. Analysis on the fire occurrence</i>	14
D. ACCIDENT CAUSES	14
<i>D.1. Direct causes</i>	14
<i>D.2. Underlying causes</i>	14
<i>D.3. Root causes</i>	15
E. SAFETY RECOMMENDATIONS	15

A. PREAMBLE

A.1. Introduction

On the 14th of February 2013, in the activity of the Branch of the Regional Center for Railway Operation, Maintenance and Repairs Galați between the railway stations Galați Brateș and Cătușa (non-electrified simple line), in current line, at km 3+480, in the running of the freight train no. 76052 (belonging to the railway undertaking SNTFM „CFR Marfă” SA) occurred a fire at the locomotive DA 67-1069-3.

The investigation commission composed as specified in Annex 3 of the *Investigation Regulation for the investigation of accidents and incidents, development and improvement of railway safety on the railway and the metro network in Romania*, approved by the Government Decision no. 117/2010, hereinafter called *Regulation* started an investigation action in order to prevent similar accidents, by establishing the conditions, determine causes and issuing safety recommendations.

The investigation action of OIFR does not aim to establish the guilt or the responsibility; it aims to improve the railway safety and to prevent the railway incidents or accidents.

The act was framed preliminary as "fire at the railway vehicles from the train compositions in traffic" according to Art. 7 (1), point e from the *Investigation Regulation for the investigation of accidents and incidents, development and improvement of railway safety on the railway and the metro network in Romania*, approved by the Government Decision no. 117/2010.

A.2. Investigation process

Taking into account that the Romanian Railway Investigating Body (OIFR) was noticed through the informative note of the General Traffic Safety Inspectorate from Branch of the Regional Center for Railway Operation, Maintenance and Repairs Galați concerning the accident occurred in the running of the freight train no. 76052 (belonging to the railway undertaking SNTFM „CFR Marfă” SA), manifested through the fire at the locomotive DA 67-1069-3 and taking into account that the railway event is defined as accident according to the provisions of the art. 7 (1), point e) from the *Regulation*, OIFR’s director decided to start an investigation and to appoint an investigation commission.

Through the Decision no. 107, from the 15th of February 2013 of OIFR director, the investigation commission was appointed, consisting in staff belonging to OIFR, ASFR-ISF Galati and SNTFM „CFR Marfa” SA, as follows:

- Marian CONSTANTIN - OIFR’s investigator - investigator in charge;
- Doru TOADER - OIFR’s investigator - member;
- Dănuț LĂPĂDUȘ - Romania Railway Safety Authority - state inspector - member;
- Doru FLOROAIKA - SNTFM „CFR Marfă” SA - central inspector - member.

B. INVESTIGATION REPORT BRIEF PRESENTATION

B.1. Brief description

On the 14th of February 2013, in the activity of the Branch of the Regional Center for Railway Operation, Maintenance and Repairs (CREIR) Galați between the railway stations Galați Brateș and Cătușa (non-electrified simple line), in current line, at km 3+480, in the running of the freight train no. 76052 (belonging to the railway undertaking SNTFM „CFR Marfa” SA) occurred a fire at the locomotive DA 67-1069-3.

The freight train no. 76052 belonging to the freight undertaking SNTFM „CFR Marfa” SA, which run on the section Galați Brateș – Cătușa, had in composition 16 CIS (Commonwealth of Independent States) wagons, loaded with ore, 64 loaded axles, brut tonnage 1495 tons, net tonnage 1111 tons, automatic braked weight percentage assured (576 real braked tons towards 493 necessary braked tons), braked weight percentage for keeping the train stopped (170 real braked

tons towards 150 necessary braked tons), 281 meters length, being hauled with the diesel – electric locomotive DA 67-1069-3.

The locomotive and employees which are operating it are belonging to the railway undertaking SNTFM „CFR Marfă” SA.

Following this accident were no injured or casualties.

The place of the accident occurrence is located in the activity area of CREIR Galați, on the running section Galați Brateș and Cătușa (non-electrified single line), between the railway station Galați Brateș and Cătușa, the track alignment being in curve with a 306 meters radius, a cant of 15 mm and a slope of 4,2 ‰.

B.2. Causes of accident occurrence

B.2.1. Direct cause

The fire occurred due the short-circuit at the force wiring from the traction engine no. 5, due the decreasing of the isolation resistance of the cables insulation and its breakthrough, which led finally at the welding of the cables at a distance of 300 mm from traction engine terminals and the ignition of the cable insulation.

Contributing factors:

- the aging phenomenon of power cables coatings traction engine no. 5;
- the poor state of cleanliness of the traction engines due the losses of fuel and oil from the installations.

B.2.2. Underlying causes

Failure to comply with the locomotive's cycle of repair and the mandatory inspections stipulated by the railway norm "Railway Vehicles. Types of inspections and planned repairs. Time norms or mileage standards for maintenance and planned repairs", approved by Ministry of Transport and Infrastructure's Order no. 315/2011, amended by the Minister of Transport and Infrastructure's Order no. 1359/2012.

B.2.3. Root causes

None.

B.3. Severity grade

According to the accident classification stipulated by art. 7 (1), point e) from the *Investigation Regulation for the investigation of accidents and incidents, development and improvement of railway safety on the railway and the metro network in Romania*, approved by the Government Decision no. 117/2010, the event is framed as railway accident.

B.4. Safety recommendations

None.

C. INVESTIGATING REPORT

C.1. Accident presentation

The freight train no. 76052 belonging to the railway undertaking SNTFM „CFR Marfă” SA, which run on the section Galați Brateș – Cătușa, had in composition 16 CIS (Commonwealth of Independent States) wagons, loaded with ore, 64 loaded axles, brut tonnage 1495 tons, net tonnage 1111 tons, automatic braked weight percentage assured (576 real braked tons towards 493 necessary braked tons), braked weight percentage for keeping the train stopped (170 real braked tons towards 150 necessary braked tons), 281 meters length, being hauled with the diesel – electric locomotive DA 67-1069-3.



The train was dispatched on a broad-gauge track from the railway station Galați Largă, at 21.50 and run until the railway station Galați Brateș, where it was stabled at 22.06. At 22.06, the train began to run, with a maximum speed of 19 km/h and stopped at 22.50 at about 150 meters before the entry signal from the railway station Cătușa. After a 2 minutes stationing, the train began to run, it moved about 50 m with a maximum speed of 2 km/h and stopped at 22.52.

According to the testimonies, after starting the train, the locomotive staff noticed a bright light in the traction engine no. 5 area, then the driver took actions for fast braking of the train and intervened with the fire extinguisher from the endowment of the locomotive for the localization of the fire.

After about 10 minutes, the driver noticed the shift of the head from the Barboși Depot to request the intervention of the firefighters, the train was assured against movement through fastening of the hand brakes from the wagons mentioned in the brake sheet.

Further, the locomotive staff requested from the movement inspector from the railway station Cătușa other fire extinguishers, being sent a number of 4 extra fire extinguishers with the locomotive DHC 007 belonging to railway undertaking SC UNICOM TRANZIT SA.

The fire was extinguished at 04.00 by Inspectorate for Emergency Situations – Galați Brigade.

On the distance between railway station Galați Brateș and Cătușa, the investigation commission did not find failures at the lines and interlocking installations, caused by the fire triggering at the locomotive DA 67-1069-3 (photo no. 1).

At the locomotive DA 67-1069-3, belonging to SNTFM „CFR Marfă” SA, which hauled the train no. 76052, the investigation commission found the following:

- the running gear and buffering were in good condition;
- the oil and water manometer and thermometer for the Diesel engine degraded (subjected to a heating treatment with high temperatures) (photo no. 2);
- the flexible tubes from the cooling installation, the lubricating with oil and the fuel supply installation of the Diesel engine were degraded (burnt) (photo no. 2);
- the electric fan for the traction engines (EMT) at the bogie no. 2 was degraded because of the excessive heating;
- the force cables from EMT no. 4 and 5 with degraded isolation (burnt) (photo no. 3);
- the force cables from the terminals E and F melted at a distance of 300 mm at the exit from the casing, at EMT no. 5 (photo no. 4).



Photo no. 1 The place where the accident occurred



Photo no. 2 The devices area from the damaged engine room



Photo no. 3 The force cables from the EMT no.4 and 5

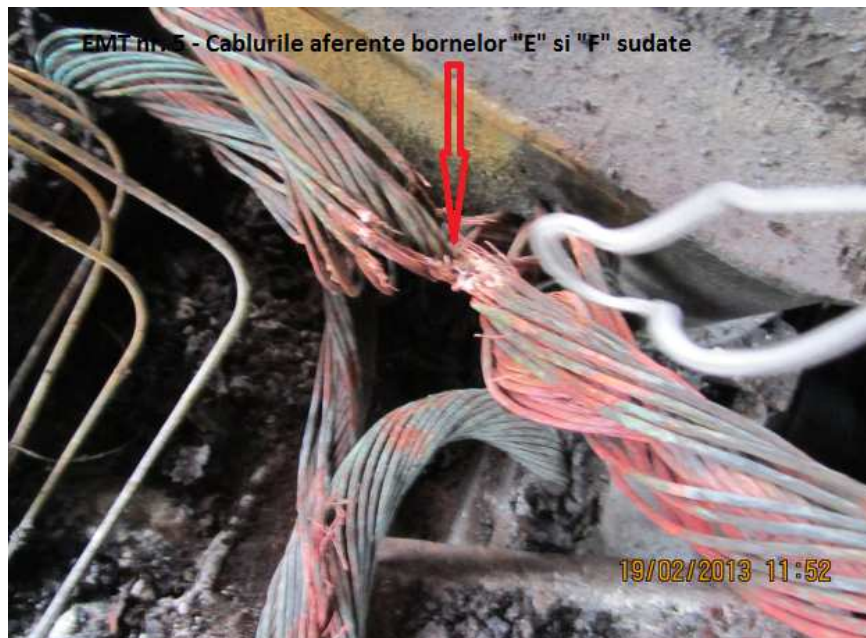


Photo no. 4 EMT no. 5 – Cables E and F melted together

C.2. Accident circumstances

C.2.1. Involved parties

The place of the accident occurrence is located in the activity area of CREIR Galați, on the running section Galați Brateș and Cătușa (non-electrified single line); between the railway station Galați Brateș and Cătușa, the track alignment is in curve with a 306 meters radius, a cant of 15 mm and a slope of 4,2 ‰.

The running section 706 M, overriding line (standard and broad gauge) Galați – Cătușa is administrated by CREIR Galați, L1 Lines Section Galați – Galați District and the interlocking installation (SCB) are belonging to SC ARCELOR MITTAL STEEL SA.

The freight train no. 76052, which run on the section Galați Brateș – Cătușa, was hauled with the diesel – electric locomotive DA 67-1069-3 belonging to the railway undertaking SNTFM „CFR Marfă” SA.

C.2.2. Composition and the equipments of the train

The freight train no. 76052 belonging to the railway undertaking SNTFM „CFR Marfă” SA, which run on the section Galați Brateș – Cătușa, had in composition 16 CIS (Commonwealth of Independent States) wagons, loaded with ore, 64 loaded axles, brut tonnage 1495 tons, net tonnage 1111 tons, automatic braked weight percentage assured (576 real braked tons towards 493 necessary braked tons), braked weight percentage for keeping the train stopped (170 real braked tons towards 150 necessary braked tons), 281 meters length, being hauled with the diesel – electric locomotive DA 67-1069-3.

The locomotive DA 67-1069-3 was built in 1975, performed the last lifting repair type RR on the 10th of November 2000 at SC RELOC SA Craiova, being due at the general overhaul type RG on the 10th of November 2004, doing 227.072 km since the last lifting repair.

The locomotive DA 67-1069-3 performed the last scheduled inspection type R2 on the period 08-13th of November 2012 at IRLU Buzău.

C.2.3. Presentation of the railway equipment involved in the accident

Track presentation

The place of the accident occurrence is situated in the activity of CREIR Galați, on the running section Galați Brateș and Cătușa (non-electrified single line); between the railway station Galați Brateș and Cătușa, the track alignment is in curve with a 306 meters radius, a cant of 15 mm and a slope of 4,2 ‰.

Track's superstructure presentation

The track's superstructure is made from rails type 65, wooden sleepers, track with joints, and maximum running speed of 30 km/h.

Railway Installations presentation

The railway station Cătușa is equipped with interlocking installations type CED, and on the distance between stations Galați Brateș and Cătușa, the railway traffic is made with automatic block system.

C.2.4 Communication means

The communication between the driver and the movement inspectors was ensured through radio-telephone.

The railway communication installation from the railway stations, on the traffic section Galați Brateș – Cătușa, are administrated by CNCF „CFR” SA and is maintained by the employees of SC ”Telecomunicații CFR” SA Bucharest.

The communication equipment from the locomotive is owned by the railway undertaking SNTFM “CFR Marfă” and maintained by the employees of IRLU workshop Buzău, from SC CFR IRLU SA.

C.2.5. Start of the railway emergency plan

Soon after the railway accident, the intervention plan for the removal of the damages and for the restoration of the railway traffic was made in accordance with the information flow stipulated in the *Investigation Regulation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety*, approved by the Government Decision no. 117/2010, according which, at the accident place came the representatives of the railway public infrastructure manager CNCF „CFR” SA, of the railway undertaking SNTFM „CFR Marfă” SA, of the Romanian Railway Authority – AFER and of the Inspectorate for Emergency Situations – Galați Brigade.

C.3. Accident consequences

C.3.1. Fatalities and injuries

None.

C.3.2. Material damages

The value of the material damages, according to the estimations drawn up by the owner of the rolling stock is:

<i>Material damages</i>	<i>Value</i>
at locomotive - according to the estimation no. 496/12 th of March 2013 of SC CFR IRLU SA - IRLU workshop Buzău	47.199,45 lei
TOTAL	47.199,45 lei

C.3.3. Consequences of the accident in the traffic

After the occurrence of this accident, the train no. 76052 had a delay of 140 minutes.

C.4. External circumstances

On the 14th of February 2013, around 23.00 the visibility was good of 1000m, clear sky, covering grade 0/10, wind speed of 3 km/h, the temperature was of +2⁰ at around 00.00.

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

C.5 Investigation course

C.5.1 Summary of the involved staff testimonies

The movement inspector from the railway station Cătușa on duty on the 14/15th of February 2013, stated:

- around 22.00 the movement inspector from railway station Filești requested free line for train no. 76052;
- around 22.40 the movement inspector from railway station Filești transmitted free pass for the train no. 76052;
- he performed the route for line "1 Largă" and put on free the calling-on signal at the entry in the station;
- at 23.00 he was contacted by the driver of the train no. 76052 which communicated that he was with the train in the near of the entry signal of the station and the hauling locomotive caught fire;
- he sent the shunting locomotive DHC 007 with fire extinguisher as an additional measures to help;
- he noticed the dispatch of the accident occurrence;
- at 0.40 was informed by the driver that the fire was extinguished by the Inspectorate for Emergency Situations, for which requested to railway station Filești a assistance locomotive for stabling of the train no. 76052 in railway station Cătușa;
- train stabled in the railway station Cătușa at 02.30.

The driver which operated the locomotive DA 67-1069-3, stated:

- he drive the locomotive DA 67-1069-3, which hauled the train no. 76052, on the 14th of February 2013, on the section Galați Brateș – Cătușa;
- he stopped the train no. 76052, at around 22.50 about 200 meters before of the entry signal of the railway station Cătușa, because this signal ordering stop;
- at 22.51, the signal had permissive indication, fact for which he put the train in motion;
- after ca.1 minute he felt a smell of burned isolation and observed flames in the area of the traction engine no. 5;
- he stopped the train, stopped the Diesel engine, disconnected the power switch and actioned with the fire extinguisher;
- after ca. 10 minutes, seeing that he couldn't extinguish the fire and that he doesn't have anymore loaded fire extinguishers he notice the shift head from the Barboși Depot to request firefighters;
- he took assuring measures of the train through hand brake fastening at the wagons;
- he requested the movement inspector from the railway station Cătușa to sent fire extinguisher;
- he took localization measures of the fire with the 4 extinguishers sent by the movement inspector from the railway station Cătușa with the shunting locomotive of the station;
- the locomotive operated normally until the apparition of the fire at the traction engine no. 5;
- the assistant driver communicated him that, with the occasion of the inspections performed in the engine room, the locomotive was normally operating;
- at starting from the front of the entry signal he noticed that although he auctioned to increase the controller steps, the ammeter of the engine groups indicated only 450 A;
- no protection was activated.

The drivers assistant which operated the locomotive DA 67-1069-3 stated:

- he operated the locomotive DA 67-1069-3, which hauled the train no. 76052, on the 14th of February 2013, on the section Galați Brateș – Cătușa;
- the train no. 76052 stopped, at around 22.50 at about 200 meters before of the entry signal of the railway station Cătușa, because this signal ordering stop;
- at 22.51, the signal had permissive indication, fact for which the driver put the train in motion;
- after ca. 1 m he felt a smell of burned isolation and observed the flames in the area of the traction engine no. 5;
- he communicated the founding from the engine room to the driver, he stopped the diesel engine and disconnected the current general switch and after that he acted the fire extinguisher;
- he assured the train against running through hand brake fastening at the wagons;

- he took localization measures of the fire with the 4 extinguishers sent by the movement inspector from the railway station Cătușa with the shunting locomotive of the station;
- with the occasion of the inspections performed in the engine room, the locomotive was normally operating;
- he tried to cut the rubber joint from the water cooling installation of the Diesel engine with the knife, but he couldn't because of the dense smoke.

C.5.2. Safety management system

At the moment of the accident, CNCF "CFR" S.A., as manager of the railway infrastructure, had implemented its own railway safety management system, according to the provisions of the Directive 2004/49/CE for the Community Railways Safety, the Law no. 55/2006 for Railway Safety and the Minister of Transports' Order no. 101/2008 on the granting of the safety authorization to infrastructure administrator/ managers in Romania.

At the moment of the accident occurrence, SNTFM "CFR Marfă" SA, as railway undertaking had implemented its own railway safety management, according to the provisions of the Directive 2004/49/EC on the Community railway safety, the Law no. 55/2006 for railway safety and of the Minister of Transports' Order no. 535/2007 for the approval of the norms for the granting of the railway transport licenses and the safety certificates in order to perform railway transport on Romanian railways.

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

In the investigation of the railway accident one took into account the next:

Norms and regulations:

- Railway Norm "Railway Vehicles. Types of inspections and planned repairs. Time norms or mileage standards for maintenance and planned repairs", approved by Ministry of Transport and Infrastructure's Order no. 315/2011;
- Order no. 1359/2012 from 30th of August 2012 for amending and supplementing the Railway Norm "Railway Vehicles. Types of inspections and planned repairs. Time norms or mileage standards for maintenance and planned repairs", approved through Minister of Transport and Infrastructure's Order no. 315/2011;
- Braking and Hauling Regulation – no. 006/2005;
- Instruction for technical inspection and maintaining for wagons in operation – nr. 250/2005;
- Instruction for the activity of the locomotives employees in the railway transport – no. 201/2007;
- Investigation Regulation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by the Government Decision no. 117/2010.

Sources and references

- questionnaires and statements of the employees involved in the accident;
- photos taken at the locomotive DA 67-1069-3 and at the accident place;
- acts, documents - copies according with the originals.

C.5.4 Operation of the technical equipments, infrastructure and rolling stock

C.5.4.1 Data found out on the installations

The railway station Cătușa is equipped with interlocking installations type CED and the railway traffic is made with automatic block system on single track.

C.5.4.2 Data found out on the lines

In the place of the accident occurrence, the track alignment is in curve with a 306 meters radius, a cant of 15 mm and a slope of 4,2 ‰.

The track superstructure is made from rail type 65, wooden sleepers, track with joints, maximum traffic speed of 30 km/h.

C.5.4.3 Data on the operation of the rolling stock and its technical equipment

The locomotive DA 67-1069-3 was built in 1975, performed the last lifting repair type RR on the 10th of November 2000 at SC RELOC SA Craiova, being due at the general overhaul type RG on the 10th of November 2004, doing 227.072 km since the last lifting repair.

The locomotive DA 67-1069-3 performed in the last two years the following inspections and repairs at the company SC CFR IRLU SA - IRLU workshop Buzău:

- type RT – 06th of January 2011;
- type 7R1 – 27/28th of April 2011;
- type RT – 25th of August 2011;
- type RT – 19th of January 2012;
- type R2 – 08/13th of November 2012;

and run a number of 3210 km since the last planned inspection, worked effective 38 days.

From the last planned inspection, this locomotive had the following period of conservation:

- 21th of November 2012 – 31th of November 2012;
- 01st of December 2012 – 06th of December 2012;
- 21th of November 2012 – 31th of December 2012.

The traction engines nr. 4 and 5 were mounted with the occasion of the last lifting repair in 2000.

The investigation commission found the followings at the locomotive DA 67-1069-3:

- the running gear and buffering were in good condition;
- the oil and water manometer and thermometer for the Diesel engine degraded (subjected to a heating treatment with high temperatures) (photo no. 2);
- the flexible tubes from the cooling installation, the lubricating with oil and the fuel supply installation of the Diesel engine were degraded (burnt) (photo no. 2);
- the electric fun for the traction engines (EMT) at the bogie no. 2 was degraded because of the excessive heating;
- the force cables from EMT no. 4 and 5 with degraded isolation (burnt) (photo no. 3);
- the force cables from the terminals E and F melted at a distance of 300 mm at the exit from the casing, at EMT no. 5 (photo no. 4).
- diesel and oil loses (photo no. 5);
- the wires from the anti-slide device dismantled from the mechanic regulator (photo no.6);
- the relays 54 not sealed (photo no. 7 and 8);
- the traction engines dirty with petroleum products (diesel and oil) (photo no. 9).

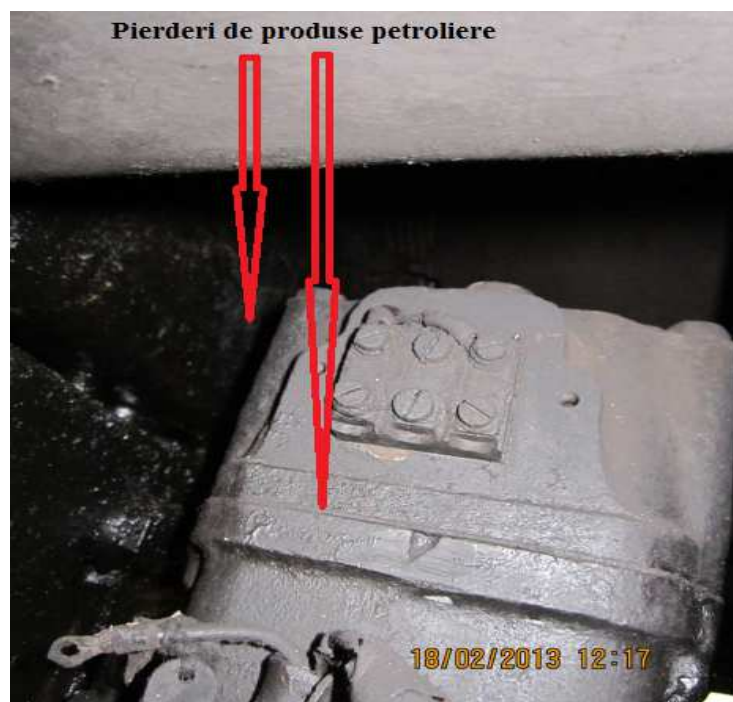


Photo no. 5 Diesel engine with diesel and oil loses

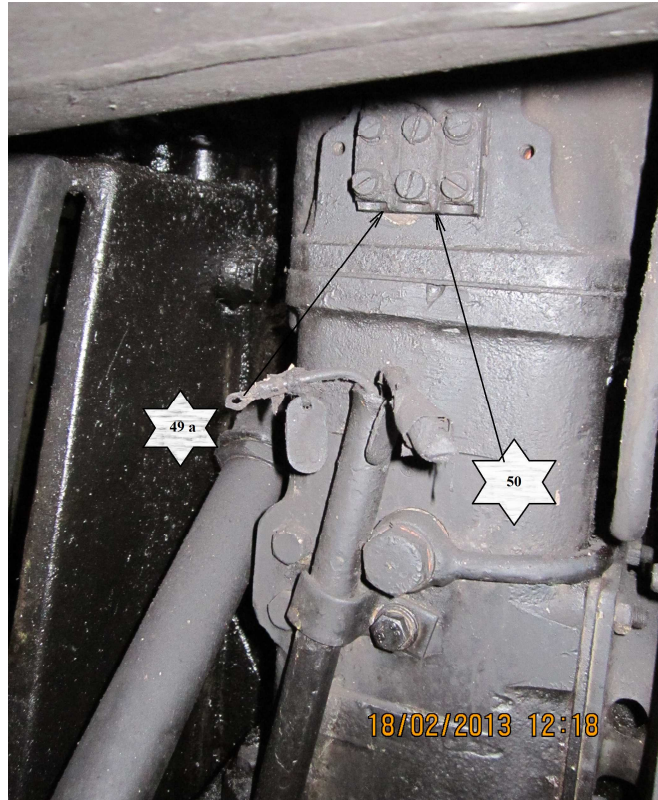


Photo no. 6 Anti-sliding from the mechanic regulator



Photos no. 7 and 8 Maximum current relay



Photo no. 9 Cleanliness of the traction engines

C.6 Analysis and conclusions

C.6.1. Analysis on the fire occurrence

From the statements and questionnaires employees involved in the operating and driving of the locomotive which hauled the train no. 76052, which run on the section Galați Brateș – Cătușa on 14th of February 2013, from the site research conducted between the railway stations Galați Brateș – Cătușa and from the verification performed at the rolling stock, the investigation commission concluded that:

- in the time of the hauling of the train on the section Galați Brateș – Cătușa the diesel engine and traction engines are stressed at maximum load and then had place the heating of the force cabling, with different potentials, afferent to the terminals E and F of the traction engine no. 5 (photo no. 10);
- due the decreasing of the isolation resistance as a result of aging phenomenon has occurred the breakthrough of cable insulation at a distance of 300 mm from traction engine no. 5 simultaneously with a short-circuit, fact which led finally at the welding of the cables and the ignition of their insulation;
- fire propagation was favored by the poor state of cleanliness of the traction engines due the losses of fuel and oil from the installations.

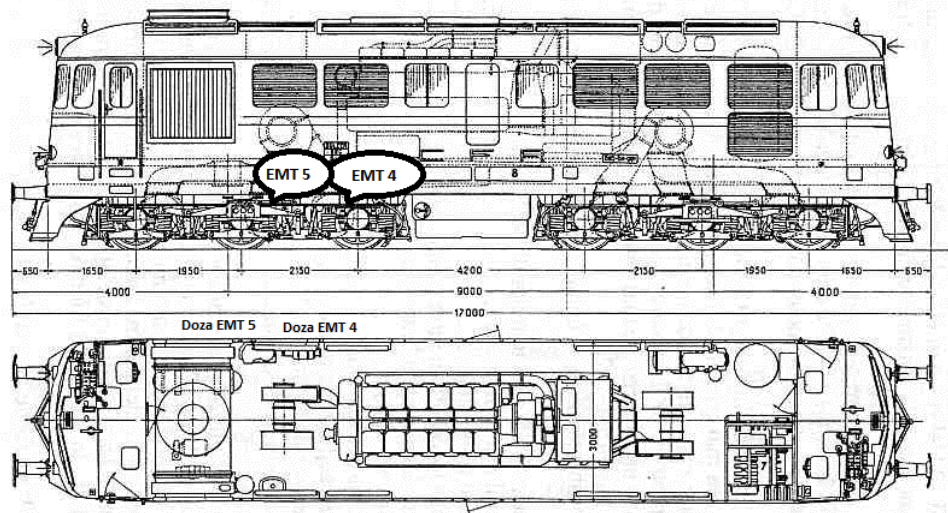


Photo no. 10 Locomotive type LDE 2100 CP

D. ACCIDENT CAUSES

D.1. Direct cause

The fire occurred due the short-circuit at the force wiring from the traction engine no. 5, due the decreasing of the isolation resistance of the cables insulation and its breakthrough, which led finally at the welding of the cables at a distance of 300 mm from traction engine terminals and the ignition of the cable insulation.

Contributing factors:

- the aging phenomenon of power cables coatings traction engine no. 5;
- the poor state of cleanliness of the traction engines due the losses of fuel and oil from the installations.

D.2. Underlying cause

Failure to comply with the locomotive's cycle of repair and the mandatory inspections stipulated by the railway norm "Railway Vehicles. Types of inspections and planned repairs. Time norms or mileage standards for maintenance and planned repairs", approved by Ministry of Transport and

