



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE  
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



# INVESTIGATING REPORT

of the railway accident  
occurred on 02.10.2012 in current line Popești - Copăceni



Final edition  
07th of February 2013

## NOTICE

Concerning the railway accident occurred on 02.10.2012, at 19.10, in the Regional center for railway operation, maintenance and repairs Craiova, non-interoperable running section Băbeni - Alunu (non-electrified single line administrated by SC RC CF Trans SRL Braşov), in open line Popeşti - Copăcenii, by the derailment of the first axle of the first bogie of locomotive DA 60-1636-4 as secondary to the freight train no. 39237, belonging to the railway undertaking SC SERVTRANS INVEST SA Bucureşti, Romanian Railway Investigating Body performed an investigation, according to the provisions of Law 55/2006 on railway safety and Government Decision no. 117/2010 on the approval of the Regulation for the investigation of the railway accidents and incidents, development and improvement of Romanian railway and subway safety.

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 considers necessary the application of corrective measures in order to improve railway safety and accident prevention, for which in this report were issued a series of safety recommendations.

Bucharest, 07th of February 2013

**Approved by**  
**Director,**  
Nicolae SANDU

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 report for the investigation of the railway accident occurred on 02.10.2012, at 19.10, in the Regional center for railway operation, maintenance and repairs Craiova, non-interoperable running section Băbeni - Alunu (non-electrified single line administrated by SC RC CF Trans SRL Braşov), in open line Popeşti - Copăcenii, by the derailment of the first axle of the first bogie of locomotive DA 60-1636-4 secondary to the freight train no. 39237, belonging to the railway undertaking SC SERVTRANS INVEST SA Bucureşti.*

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## I. Preamble

### I.1. Introduction

On 02.10.2012, in the Regional center for railway operation, maintenance and repairs Craiova, running section Băbeni - Alunu (non-electrified single line), non-interoperable section administrated by SC RC CF Trans SRL Braşov, between the railway stations Popeşti and Copăcenii, by the derailment of the first axle of the first bogie of locomotive DA 60-1636-4, belonging to the railway undertaking SC SERVTRANS INVEST SA Bucureşti.

The investigation commission composed according to the provision of Annex 3 of Regulation for the investigation of the railway accidents and incidents, development and improvement of Romanian railway and subway safety approved by GD 117/2010, hereinafter Regulation started an investigation in order to prevent some incident with similar causes, by establishing the conditions, determine the causes.

The investigation action of Romanian Railway Investigating Body does not aim to establish the guilty or the responsibility in this case, the aim being to improve the railway safety and prevent railway accidents and incidents.

The incident was classified as accident according to the provisions of art.7, paragraph (1), letter b of the Regulation for the investigation of the railway accidents and incidents, development and improvement of Romanian railway and subway safety approved by GD 117/2010. According to the provisions of Law 55/2006 on railway safety and GD no.117/2010 for approval of the Regulation for the investigation of the railway accidents and incidents, development and improvement of Romanian railway and subway safety, Romanian Railway Investigating Body performs investigating actions in order to improve the railway safety and prevention of railway accidents and incidents.

The investigating actions carried out by Romanian Railway Investigating Body are performed independently of any judicial inquiry, their aim is not to establish the guilt or responsibility.

### I.2. Investigation process

According to the provisions of art. 48, paragraph. 1 from the Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by GD 117/2010, on 04.10.2012, OIFR decided to start an investigation on the accident occurred in the **Regional center for railway operation, maintenance and repairs Craiova**, running section Băbeni - Alunu (non-electrified single line), non-interoperable section administrated by SC RC CF Trans SRL Braşov, between the railway stations Popeşti and Copăcenii, by the derailment of the first axle of the first bogie of locomotive DA 60-1636-4, belonging to the railway undertaking SC SERVTRANS INVEST SA Bucureşti.

Taking into account that the happened deeds are defined as railway accident, according to the provisions of art. 3, point l of the Law no. 55/2006 on railway safety and that this accident is relevant for the railway system, according to the art. 19, paragraph (2) from the Law no. 55/2006 on the traffic safety, in connection with the art. 48, paragraph (1) from the Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by GD 117/2010, OIFR director decided to start an investigation.

Through the OIFR director Decision no. 94, from the 04th of October 2012, the investigation commission was appointed, consisting in:

Florin Cristian STOICA – Investigator	- main investigator
Virgil BIŢĂ – state inspector, Lines	- member
Marin ANDREI- state inspector, Traction	- member

## **A. Accident brief presentation**

### **A.1. Brief presentation**

On 02.10.2012, the freight train no. 39237, belonging to the railway undertaking SC SERVTRANS INVEST SA București ran between the railway stations Băbeni - Berbești composed of 25 wagons, 1 hauling locomotive, and 1 inactive locomotive, 1 banking locomotive, 106 axles, 767 tones, length 450 meters.

At 19:07, on the non-interoperable running section Băbeni - Alunu (non-electrified single line administrated by SC RC CF Trans SRL Brașov), in current line Popești - Copăcenii, occurred the derailment of the first axle of the first bogie from the locomotive DA 60-1636-4 belonging to the railway undertaking SC SERVTRANS INVEST SA București.

The locomotive DA 60-1636-4, inactive to the train 39237 was operated by engine driver in one-man driving belonging to the railway undertaking SC SERVTRANS INVEST SA București.

Following this railway accident there were no fatalities or injured.

### **A.2. Accident causes**

#### **A.2.1 Direct cause, factors that contributed**

The direct cause consists of exceeding the tolerance admitted at the track twisting imposed by the provisions of Instruction no. 314/1986 (over 12,5mm), that had as effect the load transfer of axle no.1 of locomotive, climbing the flange of wheel from the right side of this wheel on the head of rail running surface corresponding to the outer curve rail, followed by the axle derailment.

Factors that contributed:

- the difference of 2,12 mm between the wheels diameter ( left - right) at the axle no. 1 of locomotive DA 60-1636-4;
- difference between the wheel diameter of the pair of wheels from the first bogie, is of 14.52 mm,;
- exceeding the maximum speed limit of 15 km/h.

The axle derailment occurred due to the above factors, none of them alone could have cause the locomotive axle derailment.

#### **A.2.2.Underlying causes**

- non-observance of the provisions of art.7, point.4 of the Instruction for norms and tolerances for track construction and maintenance no. 314/1989 on track twisting.
- placing into operation of the locomotive without safety conditions compliance.

#### **A2.3.Root causes**

None.

### **A.3. Severity level**

According to the provisions of art.7, paragraph (1), letter b of the Regulation for the investigation of the railway accidents and incidents, development and improvement of Romanian railway and subway safety approved by GD 117/2010, the event is defined as railway accident.

### **A.4. Safety recommendations**

None

## **B. INVESTIGATING REPORT**

### **B.1. Accident description**

On 02.10.2012, at 17:24 hour, the freight train no. 39237 (belonging to the railway undertaking SC SERVTRANS INVEST SA București) was dispatched from the railway station Băbeni, between the railway stations Băbeni - Berbești.

The freight train no. 39237 consist of 25 wagons, 1 inactive locomotive, 106 axles, 767 tones, length 450 meters and hauled by the locomotive DA 60-1564-8, DA 60-1636-4 inactivate and DA 60-0600-1 banking locomotive, belonging to the railway undertaking SC SERVTRANS INVEST SA București, being operated by drivers employees of the same railway undertaking.

The train has circulated from the departure station to the place of the accident without technical or railway safety issues. Before the accident the train had stops in the railway station Popești from 18:10 to 18:50, and at km 17+700 from 18:55 to 18:58.

From the departure from the railway station Popești and to km 17+700 the train was hauled by DA 60-1564-8 hauling locomotive, DA 60-1636-4 cold locomotive and DA 60-0600-1 active banking locomotive.

At km 17+700 the engine driver from DA 60-0600-1 communicated by Radio equipment that it can no longer bank the train because the transfer pump was disarmed. The locomotive driver DA 60-1564-8 requests the locomotive driver DA 60-1636-4 to help him hauling the train.

He starts the Diesel engine at 18.58 and the train depart around 19:07 and at km 18+605, DA 60-1636-4 derails with the first axle from the first bogie in the running direction.

### **B.2. Accident circumstances**

#### **B.2.1. Involved parties**

The running section where the railway accident occurred is under SC RC CF Trans SRL Brașov administration.

The infrastructure and superstructure of the non-interoperable running section are administrated by SC RC CF Trans SRL Brașov and maintained by the employees of the District Popești within SC RC CF Trans SRL Brașov.

The railway communication equipment onboard the locomotive is property of the railway undertaking SC SERVTRANS INVEST SA.

The locomotive involved in the derailment is owned by the railway undertaking SC SERVTRANS INVEST SA.

#### **B.2.2. Composition and the equipments of the train**

The freight train no. 39237 belonging to the railway undertaking SC SERVTRANS INVEST SA was composed of 25 wagons, 1 inactivate locomotive, 106 axles, 767 tones, 450 meters and hauled by the locomotive DA 60-1564-8, DA 60-1636-4 inactivate engine and DA 60-0600+1 banking locomotive, from which automatic braked according to the timetable 304 tones, automated 704 tones, hand braked according to the timetable 110 tones, and real for hand braking 551 tones and length of 450 meters.

The train automatic brake was active, safety and vigilance equipments (DSV), equipment for the punctual control of the speed and auto-stop (INDUSI) of the traction locomotive were active and operating according to the instruction.



### B.2.3. Railway equipments

#### Superstructure presentation

In the area where the accident occurred track is in curve with radius of 400, 500 and 700 m left deviation in the running direction, the curve started from 19+377 to 19+790, with cant of the track of +50 mm on the circular curve. In the area where the accident occurred the track long profile is on gradient 18‰, ramp in the running direction.

In the point where occurred the climbing of the outside curve rail by the right wheel of the locomotive first axle (in the running direction) is a lot of iron filings on a distance of 70 meters.



Photo 1. The trace where the rail was climbed by the right wheel of the inactive locomotive

In the area where the accident occurred, the track superstructure is in curve with radius of 400, 500 and 700 m left deviation in the running direction, the curve start at 19+377 until 19+790 with concrete sleepers, fastening system type K, complete, cant of the track of +50 mm on the circular curve.

On a distance of approximately 15 meters from the derailment, one observe on the head of the right rail two traces from the flange of two wheels that ran in parallel with the derailed axle. Forwards those two wheels came back on the rail (the traces are accompanied by the ones left by the derailed axle).



Photo 2. traces on the head of rail by 2 axles that ran on the head of rail.

The broken stone bed was complete and didn't have any riddled area.

**Findings on 08.10.2012 at the non-interoperable railway infrastructure at the derailment site**

After manual tamper of the sleepers on 08.10.2012, the measurements at gauge / track cross level were +15/32,+15/32, +18/33.

Equipments

The railway station Popești has interlocking system type SBW.

Locomotive

Preliminary findings on running line Popești - Copăceni at the locomotive DA 60-1636-4

- the locomotive was stopped and derailed by the first axle
- there were no trace of axial displacement or swarf at the join of tyre-rim;
- there were no wheel flat;
- automatic brake –all right;
- direct brake: all right;
- hand brake: all right;
- air brake compressor: normal functioning;
- compressed-air gauge status: all right and metrological inspected;
- driver's automatic brake valve: brake on;
- DSV equipment: sealed and active;
- equipment for the punctual control of the speed INDUSI isolated;
- speed recording equipment IVMS sealed.

**B.2.4. Means of communication**

The communication between the engine driver and the movement inspector was ensured through radio-telephone equipments.

**B.2.5. Starting of the railway emergency plan**



Soon after the railway accident, starting of the intervention plan for the removal of the damages and for the restoration of the traffic was made in accordance with the provisions stipulated in the Regulation for the investigation 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 Romanian Railway Authority – AFER, of the non-interoperable running section SC RC CF Trans SRL Braşov and of the railway undertaking SC SERVTRANS INVEST SA Bucureşti.

Lifting the derailed locomotive DA 60-1636-4 and re-railing was performed with local means, the locomotive was re-railed at 04:10.

To reopen the train traffic between the railway stations Popeşti and Copăcenii, from the railway station Popeşti the assistant locomotive DA 761 was routed at 02:25 and it shunted the rake of wagons no. 39237 at line no. III in the railway station Popeşti at 03.03.

### **B.3. Accident consequences**

#### **B.3.1. Fatalities and injuries**

None.

#### **B.3.2. Material damages**

The value of the material damages, according to the estimations drawn up by the owner of the rolling stock and the railway public infrastructure administrator, is:

Material damages	
At the locomotive	327.38lei
At line-according to the estimate no.	-----
Sequences of operations-according to the estimate	-----
<b>TOTAL</b>	<b>327.38lei</b>

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

Following the railway accident 2 passenger trains were cancelled between Popeşti – Alunu and Alunu – Popeşti.

The traffic between Popeşti – Copăcenii was closed on 02.10.2012, from 19.10 until 03.10.2012 at 04:40.

### **B.4. External circumstances**

On 02.10.2012, between 17:00 - 19:30 the visibility was good, temperature of + 12<sup>0</sup> C.

The visibility of the light signals was according to the provisions of the specific regulations in force.

### **B.5. Investigation course**

#### **B.5.1 Summary of the involved staff testimonies**

The investigation commission questioned the engine drivers onboard the locomotives DA 60-1564-8, DA 60-1636-4 inactive locomotive and DA 60-0600-1 that hauling the train.

**The driver** of the locomotive DA 60-1564-8, hauling the freight train no. 39237 one can be retain:

- after departure of the train at 18:50 from the railway station Popești at km 17+700, the train stopped because it could not be hauled by only one locomotive, the locomotive DA 60-0600-1 had a mechanical failure;
- I requested the locomotive driver DA 60-1636-4 to start the Diesel engine and to help me haul the train;
- after about 2 km at km 16 + 600 the locomotive driver DA 60-1636-4 notify me to stop the train because he notice the pressure drop in the main brake pipe;
- after the train stopped and the engine hand brake was fasten, I went down from the driver's cab and notice the locomotive DA 60-1636-4 was derailed by the first axle from the first bogie in the running direction. I notify that, by radiotelephone equipment, the movement inspector from the railway station Popești.

**The driver** of the engine DA 60-1636-4, (inactivate locomotive) to the freight train no. 39237 one can be retain:

- after departure of the train from the railway station Popești, the engine driver DA 60-0600-1 communicated by Radio equipment that his engine stopped because the transfer pump was disarmed;
- I was requested by the locomotive driver DA 60-1564-8 to start the Diesel engine and help him to haul the train;
- after about 2 km at km I heard an abnormal noise at the locomotive 60-1636-4 and I have stopped the Diesel engine, I notify the locomotive driver DA 60-1564-8 to stop the train and I brake one it;
- after the train stopped and the engine hand brake was fasten, I went down from the driver's cab and notice the the locomotive DA 60-1636-4 was derailed by the first axle from the first bogie in the running direction.

**The driver** of the locomotive DA 60-0600-1, banking locomotive to the freight train no. 39237 one can be retain:

after the train departure from the railway station Popești, after about 500 m I notify the locomotive driver DA 60-1564-8 that the transfer pump was disarmed and to haul the train including the locomotive;

- after about 2 km I felt that the train stopped;
- I asked about the occurrence and I was notified that the locomotive DA 60-1636-4 was derailed by the first axle from the first bogie in the running direction.

#### B.5.2. Safety management system

At the moment of the accident, SC RC CF TRANS SRL Brașov, as manager of the railway infrastructure, had implemented its own railway safety management, according to the provisions of the Directive 2004/49/CE on the community railways safety, of the Law no. 55/2006 on the railway safety and of the Minister of Transports Order no. 101/2008 on the granting of the safety authorization to Romanian railway infrastructure administrator/manager, getting:

- Safety Authorization – Part A, identification number ASA 08001 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of the safety management of the railway infrastructure manager;
- Safety Authorization – Part B, identification number ASB 12007 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of the dispositions taken by railway infrastructure manager in order to comply with the specific requirements necessary to assure the railway infrastructure safety, in the designing, maintenance and operation, including if case, maintenance and operation of the system for the traffic control and signalling.

Also, SC SERVTRANS INVEST SA, as railway undertaking had implemented its own railway safety management, according to the provisions of the Directive 2004/49/EC on the community railways safety, of the Law no. 55/2006 on the railway safety and of the Minister of Transports Order no. 535/2007 on the granting of the safety certificate in order to perform railway transport on Romanian railways, getting:

- Safety Certificate – Part A, identification number CSA 007 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of safety management system of the railway undertaking;

- Safety Certificate – Part B, identification number CSB 0136 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of the dispositions taken by the railway company in order to comply with the specific requirements necessary for the safety operation on the relevant network, in accordance with the Directive 2004/49/EC and with the applicable national legislation.

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

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

#### Norms and regulations

- *Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by the Government Decision no. 117/17.02.2010;*
- *Regulation for railway technical operation no. 002, approved by Public Works, Transport and Housing Minister's Order no. 1186/29.08.2001;*
- *Instruction for repairs of railway vehicles wheels-set no.931 from 1986;*
- *Railway technical norm N.T.F. 81-002/2004. Railway vehicles. Pair of wheels. General technical conditions for quality, approved by O.M.T.C.T. no. 1826/07.10.2004;*
- *General Direction of Traction Order no. 310/4/a/2800/col. 1993 – Technical operation conditions for the electric locomotive axles – CFR;*
- *Instruction for setting the terms and order of the track inspection no. 305, approved by Minister of Transports Order no. 71/17.02.1997;*
- *Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989;*

#### sources and references:

- copies of the documents requested by the inquiry commission, enclosed to the investigation file;
- photos taken soon after the railway accident by the members of the investigation commission;
- photos taken at the involved locomotive DA 60-1636-4, at the accident site;
- documents concerning the line repairs provided by their maintenance staff;
- results of the measurements performed soon after the railway accident at the track superstructure;
- results of the measurements performed soon after the railway accident at the locomotive;
- the examination and interpretation of the technical condition of the elements involved in the accident: infrastructure and locomotive;
- questionnaires of the employees involved in the railway accident.

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

#### B.5.4.1 Data found out on the lines

#### Technical condition of the line and track equipment before the railway accident

The last scheduled track maintenance was in 2010 .

The measured values at that time exceeded the tolerances allowed in the *Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989*, because there is a track twist, with more than 12,5 mm difference between 2 consecutive measures at cross level at 2,5 meters corresponding speeds between 10 – 30 km/h.

#### Findings and measurements at the line, after the derailment and re-railing of the locomotive

The line is in curve with radius of 350, 500 and 700 m left deviation in the running direction, the curve start from 19+377 to 19+790, with concrete sleepers, fastening type K, complete, cant of the track +50 mm on constant-radius curve, gradient 18‰, ramp in the running direction.

The measures with chord of 10 had the following values: f= 15. 20, 25, 30, 35. 25, 20, 20. The measures were performed between km 19+585 – 19+680.

When checking with the device for wear measuring, the following values resulted:

CL31 wear - 4 mm

CV147 outside rail wear - 2 mm

CV147 inside rail wear - 2 mm

The broken track bed was complete both between the sleepers and at their end, the tamping was performed in 2010.

From the first trace on the lateral surface, between the rail, of the rail corresponding to the curve interior rail, opposite to the running direction, the checking of the gauge (E) and the track level crossing (N) made with the gauge and superelevation measuring device from 2,5 m to 2.5m.

The measured values (2 before and 10 after including the derailment point) were as follows +19/14,+20/14 +**15/25**, +20/35, +16/52, +11/68, +4/77, +5/80, +2/72, +4/68, +2/77, 0/80 (the derailment point with bold letters).

#### Findings on 08.10.2012 at the non-interoperable railway infrastructure at the derailment site

After manual tamping on 08.10.2012, measures at E/N were +15/32,+15/32, +18/33.

#### B.5.4.2. Data on the operation of the rolling stock and its technical equipments

##### Findings at the train locomotives

On 04.10.2012, at SC IRLU SA București – Craiova Repairs Section after the derailment one performed measures and checks on the locomotive DA 60-1636-4 belonging to SC SERVTRANS INVEST SA, derailed with the first axle in the running direction (axle no.1 from the locomotive) where one found out the followings:

- there were no traces of axial displacement or swarf at the join of tyre-rim;
- there were no wheel flats;
- there were no functional or constructive defects at the transversal coupling; (measuring evidence code FMBLDE 05, SC IRLU SA)
- no items were found missing, deformed or non-compliant at the suspension, brake rigging or running gear;
- one performed measures of the tire and wheels-set dimensions, the measured values were within the prescribed instructional values, according to R.E.T.002/2001; (measuring evidence code FM1, SC IRLU SA)
- following the rolling circle diameter measuring at bogie I, on the lathe for treads belonging to SC IRLU – Craiova Repairs Section (measuring evidence code FM-01 SB) one found that the permissible value was exceeded at the difference between the rolling circle diameters at bogie 1(2,12mm) and exceeding the permissible value at the difference between the rolling circle diameters between the axles (over 10 mm).

According to the Order no. 305/28.09.2012, SC SERVTRANS INVEST SA, Râureni working point, one requested **turning axle 1 right (RA)**, the turning was performed in the same date, all required operations on 28.09.2012 at 16.30.

The turning was performed at Râureni working point.

When checking the inspection sheets, one found out that the Norms for performing the planned inspections at the motorized railway vehicles according to Table 3.1 Annex 1 from OMTI 1359/2012 are not observed, from the conformity statements doesn't result the performed inspections type.

## **C.6. Analysis and conclusions**

### **C.6.1. Conclusions on the technical condition of the track superstructure**

On 02.10.2012 the train no. 39237 had exit order from the railway station.

In the railway accident area the horizontal profile track is on gradient 18‰, ramp in the running direction.

From the first trace on the lateral surface, between the rail, of the rail corresponding to the curve interior rail, opposite to the running direction, the checking of the gauge (E) and the track level crossing (N) made with the track gauge and superelevation measuring device from 2,5 m to 2.5m.

The measured values at that time exceeded the tolerances allowed in the *Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989*, because there is a track twist, with more than 12,5 mm difference between 2 consecutive measures at level at 2,5 meters for speeds between 10 – 30 km/h.

After manual packing of the sleepers on 08.10.2012, the measurements at gauge / track level crossing were +15/32,+15/32, +18/33.

### **C 6.2. Conclusions on the technical condition of the locomotives within the train composition**

On 04.10.2012, at the locomotive DA 60-1636-4 at SC IRLU SA București – Craiova Repairs section after the derailment were performed the following measures:

- locomotive tyre quota measure, including „D” quota, in 3 points, the measured values are in the prescribed instructional values, according to the *Regulation for railway technical operation no. 002/2001* and Instruction no. 931/1986;
- there were no wheel flats;
- there were no traces of axial displacement or swarf at the join of tyre-rim;
- there were no functional or constructive defects at the transversal coupling; (measuring evidence code FMBLDE 05, SC IRLU SA)
- no items were found missing, deformed or non-compliant at the suspension, brake rigging or running gear;
- one performed measures of the tyre and wheels-set dimensions, the measured values were within the prescribed instructional values, according to R.E.T.002/2001; (measuring evidence code FM1, SC IRLU SA)
- following the rolling circle diameter measuring at bogie I, on the lathe for measuring the wheels diameter belonging to SC IRLU – Craiova Repairs Section (measuring evidence code FM-01 SB) one found that the permissible value was exceeded at the difference between the rolling circle diameters at bogie 1(2,12mm) and exceeding the permissible value at the difference between the rolling circle diameters between the axles (over 10 mm), the measures performed on the lathe for trade belonging to IRLU Craiova Section, which is authorized by AFER;

## **B.7. ACCIDENT CAUSES**

### **B7.1. Direct cause and contributing factors**

The direct cause consists of exceeding the tolerance admitted at the track twisting imposed by the provisions of Instruction no. 314/1986 (over 12,5mm), that had as effect the load transfer of axle no.1 of locomotive, climbing the flange of wheel from the right side of this wheel on the head of rail running surface corresponding to the outer curve rail, followed by the axle derailment.

Factors that contributed:

- the difference of 2,12 mm between the wheels diameter ( left - right) at the axle no. 1 of locomotive DA



60-1636-4;

- difference between the wheel diameter of the pair of wheels from the first bogie, is of 14.52 mm,;
- exceeding the maximum speed limit of 15 km/h.

The axle derailment occurred due to the above factors, none of them alone could have cause the locomotive axle derailment.

#### B.7.2.Underlying causes

- non-observance of the provisions of art.7, point.4 of the Instruction for norms and tolerances for track construction and maintenance no. 314/1989 on track twisting.
- placing into operation of the locomotive without safety conditions compliance.

#### B.7.3.Root causes

None.

### C. SAFETY RECOMMENDATIONS

None

The present Investigating Report will be transmitted to Romanian Railway Safety Authority, to the non-interoperable running section administrator SC RC CF Trans SRL Braşov, and to the railway freight undertaking SC SERVTRANS INVEST SA Bucureşti.

Members of the investigation commission:

- |  |                     |
|--|---------------------|
| ▪ Florin Cristian STOICA – Investigator    | - main investigator |
| ▪ Virgil BIŢĂ – state inspector, Lines     | - member            |
| ▪ Marin ANDREI – state inspector, Traction | - member            |