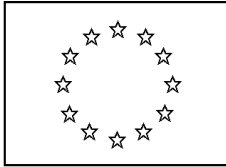


REPORT
ON THE 10TH JOINT CROSS-BORDER
EMC MARKET SURVEILLANCE CAMPAIGN
(2018)

POWER LINE COMMUNICATION (PLC)
APPARATUS
(for in-home use)

October 2018



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A. EXECUTIVE SUMMARY

As a result of the discussions at the 42nd EMC Administrative Cooperation Working Group (EMC ADCO) meeting in Amsterdam, it was decided that the tenth joint cross-border EMC market surveillance campaign would assess the compliance of Power Line Communication (PLC) apparatus intended for in-home use.

PLC apparatus are also called Power Line Telecommunication (PLT) apparatus ¹, and could be marketed as Powerline Adapters or Powerline PassThru Adapters.

PLC technology consists of the utilization of power lines as a transmission medium, i.e. PLC technology uses the existing public and private mains power wiring for the transmission of telecommunication signals, offering Internet access via electrical networks in the home and at work.

This report provides an overview of the findings and makes recommendations on next steps and future actions.

The primary purpose of the campaign is to assess the compliance of the equipment under test ('EUT'), samples taken from the European market, with the essential requirements of the EMC Directives 2004/108/EC or 2014/30/EU.

This campaign has several goals, which include:

- to determine the administrative and technical compliance levels of Power Line Communication (PLC) apparatuses available within the EU market;
- to apply the measures of new EMC Directive 2014/30/EU (including safeguard procedure) for Power Line Communication (PLC) apparatuses placed on the market from 20 April 2016.
- to take appropriate compliance actions to rectify non-compliances;
- to propose further actions;
- to improve cooperation and information exchange between MSA's;
- to increase knowledge of the Power Line Communication (PLC) apparatus industry;
- to improve the knowledge of manufacturers; importers; distributors; and economic operators of their obligations under the EMC Directive;
- use the new ICSMS DRPI and become familiar with it.

Eleven national Market Surveillance Authorities ('MSA') EMC ADCO members participated in the campaign. 46 products were assessed between the 1st January 2018 and the 31th August 2018. In general, the level of compliance with the administrative and technical requirements was considered as very low. Overall, only 17 % of the Equipment Under Test ('EUT') were assessed as compliant.

Based on this campaign EMC ADCO has formulated conclusions and recommendations which can be found in Chapter D of this report.

Administrative compliance

The results of the administrative assessment of EUT showed:

- 61% of EUT were considered administratively compliant.
- All EUT had the correct CE marking (100%).

¹ Historically the two abbreviations "PLC" and "PLT", also "PLC port" and "PLT port" have been used interchangeably " in the standards and in the technical literature.



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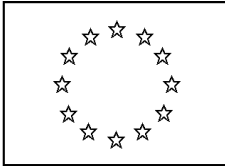


- Declarations of Conformity (DoC) were available for all 46 EUT; six of them were non-compliant. Overall, 87% of assessed DoC were compliant.
- From the requested 20 Technical Documentation ('TD'), 16 were supplied. Of those, 13 were found to be compliant (65% overall compliance).

Technical compliance with harmonised standards

For the purposes of this campaign, technical compliance is to be understood as compliance with an applicable harmonised standard.

The results of the technical assessment of PLC apparatuses (for in-home use) showed that nearly three fourths of tested EUT were non-compliant (i.e. 26% overall compliance to harmonised standards).



B. ELEMENTS OF THE CAMPAIGN

1. Reasons for the campaign

As a result of the discussions at the 42nd EMC Administrative Cooperation Working Group (EMC ADCO) meeting in Amsterdam, it was decided that the tenth joint cross-border EMC market surveillance campaign would assess the compliance of Power Line Communication (PLC) apparatus intended for in-home use. For the purpose of this campaign, the MSA assessed the compliance of the Power Line Communication (PLC) apparatus intended only for in-home use and solely communicating to each other in the same home.



Fig.1. Examples of power line communication apparatus intended for in-home use.

PLC systems available today mostly use only one transmission path between two outlets. It is the differential mode channel between the phase (or live) and neutral contact of the mains. These systems are called **SISO** (*Single Input Single Output*) modems. In contrast, **MIMO** (*Multiple Input Multiple Output*) PLC systems make use of the third wire, PE (Protective Earth), which provides several transmission combinations for feeding and receiving signals into and from the low voltage distribution network. There are no standard for PLC using MIMO technology.²

2. Scope of the campaign

The primary purpose of the campaign was to assess the compliance of samples taken from the market with the provisions of the EMC Directives 2004/108/EC or 2014/30/EU. Administrative compliance was checked against the CE marking, Declaration of Conformity, and the relevant parts of the technical documentation of

² prEN 50561-4 *Power line communication apparatus used in low-voltage installations - Radio disturbance characteristics - Limits and methods of measurement - Part 4: Apparatus using MIMO technology* is under preparation.



the acquired EUT. For the purposes of this campaign, it was decided to assess compliance with the EMC essential requirements (i.e. generated electromagnetic disturbances of EUT) by testing against a relevant harmonised standard³. Immunity aspects were assessed on a voluntary basis.

The campaign was also intended to provide MSA with the opportunity to participate in EMC market surveillance, to improve the exchange of information and to raise economic operator and consumer's awareness of the need for conformity with the requirements of the EMC Directive.

It was agreed that following the analysis of the results of the campaign, a report would be prepared and presented to the EMC Working Party for subsequent publication by the Commission. The present document constitutes the report of the campaign.

3. Participation in the campaign

Participation in the campaign was voluntary, and was open to all members of EMC ADCO. Each MSA was responsible for the costs of obtaining the EUT and tests.

Eleven European countries participated in the campaign: Cyprus, Estonia, Finland, Germany, Hungary, Lithuania, Luxembourg, Netherlands, Portugal, Switzerland, and the United Kingdom.

4. Timing

The campaign commenced on the 1st January 2018. The information gathering, testing and data reporting phases of the campaign were of eight months duration, ending on the 31st of August 2018. Within that period, MSA carried out their actions to their own timescales. During the last months (September 2018) all results of testing and administrative assessment were collected together and the final report of the joint action was prepared.

5. Sampling

The aim was to obtain the broadest possible view of the investigated product group in the European marketplace. Therefore, a quasi-random sampling was performed over the whole price range, and from all origins (national, EEA, and imported from third countries). However, to avoid double sampling, participating MSA were encouraged to upload details of their selections into ICSMS as early in the course of campaign as possible.

Selected EUT can fall under EMC and LV Directives. The number of selected EUT is recommended 3 different individual types for each participating MSA, but MS were free to select any number of EUT for this campaign.⁴ Selections may include products purchased on the internet (from eBay, Amazon, etc.). In order to maximise the value of this campaign and increase knowledge of the marketplace the aim is to select products

³ EUT were assessed against harmonised standards displayed in the DoC (if available). See chapter 7 for the applicable standards.

⁴ For testing purposes two PLC devices (compatible (the same type) and paired) were used: one as EUT (equipment under test), and the other as AE (associated equipment).



from the broadest range possible. PLC apparatus with radio function are excluded from this campaign, as it falls to the scope of the RED.

6. Documents

A Code of Practice was drawn up to provide guidance and a common understanding of the purpose of the campaign and to ensure, as far as possible, the adoption of harmonised practices during the carrying out of the campaign. The results of the assessment of each EUT were recorded on a common electronic data input form for EMC (EMC DIF V4.0).

7. Tests performed

For the purposes of the campaign, it was agreed to assess compliance to the EMC essential requirements by measuring against the harmonised standards according to the DoC issued by the manufacturer.

Actual situation for conducted and radiated emissions test:

EN 50561-1:2013 + AC:2015 ⁵
EN 55032:2012 could be used until 2016-10-09 ⁶
EN 55022:2010 could be used until 2016-10-09

Actual situation for immunity to disturbances tests:

EN 50412-2-1:2005 + AC:2009
EN 61000-6-1:2007 or EN 61000-6-1:2001 could be used until 2008-04-01
EN 55024:1998 + A1:2001 + A2:2003 could be used until 2008-04-01.

For the purposes of the campaign it is agreed to assess compliance with the EMC essential requirements (only emission, immunity aspects could be assessed on voluntary basis) by measuring against the harmonised standards according to the DoC issued by the manufacturer.

If DoC is not available for the EUT, then the assessment for the RF emissions should be done against EN 50561-1:2013 + AC:2015 harmonised standard, and immunity assessment according to EN 50412-2-1:2005 harmonised standard.

MSA assessed:

1. Conducted disturbances at telecommunications/network ports in the frequency range 150 kHz to 30 MHz;
2. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (when user data is being transmitted);
3. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (without user data transmission);
4. Radiated disturbances in the frequency range 30 MHz to 1 000 MHz.

⁵ For PLC hat uses frequencies including those above 30 MHz in order to communicate, EN 50561-3:2016 could be used.

⁶ i.e. could appear in DoC for products placed on the market before 2016-10-09



C. RESULTS

1. Number and origin of products

MSA had to report on the country where EUT has been manufactured; the information “Made in” present either on the EUT itself, on its packaging or on the accompanying documents and finally from the DoC (where available). The “country of origin” therefore refers not generally to the economic operator who is responsible for placing the product on the EU market.

A total of a forty-six (46) products were selected and evaluated, as follows:

Country of origin	Number of evaluated PLC apparatuses	Level of compliance of assessed administrative and technical requirements during the campaign: number (%)
China	35	5 (14 %)
EU	3	0
Taiwan	1	0
Unknown	7	3 (43 %)
All origins	46	8 (17 %)

Conclusion: the PLC apparatuses were made mainly in China (76 %). The level of overall compliance of products that were of unknown origin was higher.

2. Administrative compliance

The EUT were assessed for the presence and format of CE marking, the availability and compliance of the DoC, and technical documentation.

Number checked	Number compliant	Compliant (%)
46	28	61

2.1 CE marking

All assessed EUT were CE marked, all fulfil the layout requirements and CE mark height requirement.

Number assessed	Not fulfil CE mark requirements	Missing CE mark	Number of compliant CE mark	Overall CE marking compliance (%)
46	0	0	46	100



2.2 EC Declarations of Conformity (DoC)

MSA assessed 46 EUT against the DoC requirements. 6 DoC were found compliant.
19 DoC were issued in EU (or in Switzerland), 15 DoC were issued in China, 8 in Taiwan, and 4 in the USA.

Table 4: Compliance with DoC requirements				
Number of EUT assessed	DoC available	DoC available (%)	DoC compliant	Overall DoC compliance (%)
46	46	100	40	87

Table 5: Compliance rate of the DoC requirements	
Requirements for DoC	Compliance rate for 46 DoC (%)
Reference to EMCD	96
Identification of the apparatus	100
Name and address of the manufacturer	100
Dated reference to the specifications	93
Date of declaration	96
Identity of the person empowered to bind the manufacturer	98
Signature of the person empowered to bind the manufacturer	100

2.3 Technical documentation (TD)

MSA requested TD for 20 of the 46 EUT, however 16 were supplied. Of those 13 were found to be compliant.

Table 6: Compliance with TD requirements				
Number assessed	TD available	TD available (%)	TD compliant	Overall TD compliance (%)
20	16	80	13	65

2.4 Traceability Requirements

Manufacturers shall ensure that products which they have placed on the market bear a type, batch or serial number or other element allowing its identification. Manufacturers and importers (if manufacturer is not established in the EU) shall indicate, on the product, their name, registered trade name or registered trade mark and the postal address at which they can be contacted.

A total of 46 products were assessed, as follows.



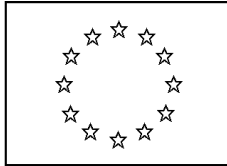
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Requirement of traceability	Number compliant	Compliance (%)
Identification requirements (type designation)	46	100
Name of the manufacturer	44	96
Address of the manufacturer	38	83
Name of the importer	21 *	81
Address of the importer	21 *	81

* In 20 cases the information of importer was not required, because the manufacturer is established in the EU.

According to the assessed results the name and address of the manufacturer has been indicated better than the name and address of importer.



3. Compliance with harmonised standards

3.1 Emissions requirements

The measured result was compared directly with the limit in the harmonised standard without taking into account the measurement uncertainty. A failure was recorded if any emission exceeded a certain limit when measured with the appropriate detector.

46 EUT were assessed for the emissions of:

1. Conducted disturbances at telecommunications/network ports in the frequency range 150 kHz to 30 MHz;
2. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (when user data is being transmitted);
3. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (without user data transmission);
4. Radiated disturbances in the frequency range 30 MHz to 1 000 MHz.

The technical compliance rate of the products tested for emissions was as follows:

Number tested	Number compliant	% compliant
46	12 *	26

* Three PLC apparatuses were tested without data transmission.

3.2 Immunity requirements

Immunity tests were not performed during this campaign.

4. Other evaluations

4.1 DoC compliance vs. compliance with emissions requirements

EUT with a correct DoC had a better rate of technical compliance than those with not correct DoC.

DoC	Number of DoC	Number of emissions compliant products	Emissions compliant products (%)
DoC not correct	6	1	17
DoC - correct	40	11	28
DoC issued after 2016-10-09			
DoC issued before 2016-10-09			



5. Overview of findings

Table 9 summarises the overall compliance of EUT in terms of emissions against harmonised standards, overall administrative, CE marking and Declaration of Conformity requirements.

Table 9: Overview of findings					
Number assessed	Overall compliance (%)	Emissions (%)	Administrative (assessed formal requirements)		
			Overall adm. (%)	CE Marking (%)	DoC (%)
46	17	26	61	100	87



D. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

- PLC apparatus were made mainly in China (76 %).
- Approximately only one-fourth (26 %) of the tested EUT met the disturbance emissions compliance tests.
- More than a half (61 %) of the EUT met the administrative requirements (as assessed).
- All assessed EUT were CE marked correctly.
- 87 % of the DoC provided were correct. This represents quite high percentage of correct DoC.
- Only 17 % of the EUT were assessed as overall compliant. In general, the level of compliance with the administrative and technical requirements is considered as very low.
- The EUT represented a large sample of the products available on the market and it is clear that much remains to be done by manufacturers in terms of compliance.
- The impact assessment for the 10th EMC market surveillance campaign has proven its justification.
- The use of ICSMS for sampling EUT was very helpful.
- The resource in conducting this type of campaign is significant. Activities including preparation (eg. drafting its Code of practice), coordination, tests and analysis of the results and the drafting of the report are carried out by EMC ADCO members supplemental to their national activities.

2. Recommendations

It is recommended that:

- The results of the campaign should be publicised widely throughout Europe and the other countries where the products originate. Publicity should target all economic operators in the area of power line communications industry.
- MSA should take the results of this campaign into consideration when making their multi annual plan as stated in the Regulation (EC) 765/2008.
- The results of this campaign should be forwarded to the European Standardisation bodies in order to take into account in the development of the future standards for the PLC apparatuses.
- The test method for radiated emissions of PLC apparatus is not adequately specified in the EN 50561-1 standard (it only gives reference to EN 55022 standard), and therefore results of testing in different laboratories might be inconsistent. The CENELEC TC 210 should consider specifying this test method for PLC apparatus in detail.
- MSA who did not participate should be encouraged to join in future campaigns. Regulation (EC) 765/2008 promotes in article 25 this type of cooperation and actions between MSA.
- A similar campaign should be considered on the same basis after a certain period to assess the effect on the market. This campaign should focus on the PLC products placed on the market after 9 October 2016.
- MSA shall increase the use ICSMS in the future campaigns for sampling and exchange of information.
- Market surveillance actions for PLC apparatuses should be continued.