1. BASIC INFORMATION
1.1 DÉSIRÉE NUMBER: PL01.02.02 Twinning number: PL/IB/2001/EC/05/TL
1.2 TITLE: Implementation of the EC regulations in the field of metrology
1.3 SECTOR: Internal Market
1.4. LOCATION: Poland

2. OBJECTIVES
2.1 WIDER OBJECTIVE
Development of the administration of measures capacity for implementation of acquis communautaire in the area of the free movement of goods.
Full harmonization and implementation of EC laws and achievement of technical level relevant to that of the EU metrology laboratories in the areas of metrology indicated by this project.

2.2 IMMEDIATE OBJECTIVE
The main goal to be reached at the end of the project is to establish long-term foundations for metrological infrastructure in Poland. The project includes the following domains: metrological regulations and procedures for metrological control; gas volume measurements; mass measurements; hardness measurements; electrical energy measurements; density and surface tension measurements; and gas mixture measurements.
Increasing the professional level in mentioned above domains will make GUM better prepared to satisfy needs of industry and public health and safety.

2.3 ACCESSION PARTNERSHIP AND NPAA
The objectives remain in alignment with AP and NPAA. They are identified as medium-term objectives in AP: ‘Internal Market – Free movement of goods: complete alignment including conformity assessment and market surveillance systems; complete adoption of EN standards; complete alignment of sectoral legislation; ensure implementing structures for all sectors.’ In NPAA it is ‘Priority 1.2: Adjustment of the Polish legislation in the area of legal metrology’. Activity aimed at adjustment to the EU regulations in above mentioned area is the result of screening meetings and is comprised in the Polish Position in the free movement of goods chapter.

3. DESCRIPTION
3.1 BACKGROUND AND JUSTIFICATION
The Central Office of Measures (GUM) is an institution of the state administration responsible for implementation of the acquis communautaire to the Polish law in the field of metrology. The tasks of GUM encompass activity typical for administration as well as that of a research institute. Fulfilment of these tasks requires highly advanced scientific equipment and very well trained staff. Therefore the implementation of the law of the European Union is impossible without the assured capability of performing tests and evaluation. Achievement of this capability needs advanced metrological equipment. Poland should issue legal regulation defining: procedures for metrological control applied in EC, and methods of metrological control in the EU: EC type approval, EC initial verification. On the accession to the EU, GUM is obliged to implement the metrological regulations and procedures for metrological control in compliance with the EC directives especially procedures for EC type approval and EC initial verification. As a result of realization of the project, the Polish legal and technical metrology regulation will not be a barrier to the free movement of goods (by removing technological trade barriers) and will ensure product’s safety. Realization of this project will contribute to widening technical collaboration between GUM and laboratories of the EU Member States and facilitate further co-operation and alliances between Polish and EU industries and institutes as the metrological systems in Poland and EU will resemble each other. It should be recalled that incorporation of the acquis into legislation is itself not sufficient; it will also be necessary to ensure that it is actually applied to the same standards and the same level of metrological equipment as those, which apply within the EU. There is a need for credible and effective implementation and enforcement of the acquis. Taking the above into consideration, there is a need for:
- Creating conditions for implementation of EU legislation;
- Implementation of metrological regulations and procedures for metrological control in compliance with the EC directives;
- Reinforcement of the central and regional administration of measures:
- unifying and harmonizing the methods of metrological control in conformity with directive 71/316/EEC (with later amendments), taking into account the alternative forms of metrological control,
- enforcing the requirements of directive 74/148/EEC relating to weights from 1 mg to 50 kg of above-medium accuracy,
- ensuring testing of Brinell hardness blocks in compliance with European standard EN 10003-3 'Metalic materials – Brinell hardness test - Part 3: Calibration of standardised blocks to be used for Brinell hardness testing machines',
- creating the possibility of carrying out the type approval procedures in the range of electrical energy meters in accordance with directives (76/891/EEC and 82/621/EEC).
- implementation of procedures for metrological control of the density and surface tension liquid standards and measuring instruments in accordance with EU directives 76/765/EEC and 76/766/EEC,
- implementation of European standards (EN 50054 – 50058 and EN 45544-1 – 45544-4) to ensure traceability of measurements for the environmental and labour conditions protection. It refers to the implementation of the following standards:
  EN 50054 - 50058 - Electrical apparatus for the detection and measurement of combustible gases,
  EN 4544-1 - 4544-4 – Workplace atmospheres – Electrical apparatus used for the direct detection and direct concentration measurements of toxic gases and vapours;
- Modernization of the laboratories at the Central Office of Measures and regional verification offices;
- Establishment of new measuring installations at the Central Office of Measures, as well as at the regional and local verification offices.

The Central Office of Measures, as a governmental body, fulfils needs mainly in the area of legal metrology, that is, guarantees legal metrological control for measuring instruments and plans to develop this area of its activity in the future. The tasks mentioned in the Phare 2001 project are also to serve this purpose in the frame of hierarchy scheme of instruments for mass measurements as well as electrical energy, gas volume, gas mixture etc. – measuring instruments. The measuring procedures have to ensure the traceability from the national standard of measurement unit at the top of hierarchy to every measuring instrument used in trade and industry. GUM, at the same time, performs duties of national metrology institute (NMI) and its activity focuses on scientific metrology as well as industrial metrology, comprising maintenance and calibrations of standards for accredited laboratories and industry. These three areas of GUM's activity are all interconnected and for that reason GUM is interested in keeping them all under its management. GUM's activities are based on a strategy being in agreement with the state policy. This strategy was elaborated on the grounds of its many years' experience (GUM celebrated its 80 anniversary a short time ago) and on collaboration as an active member within international and regional organizations in the fields of metrology and hallmarking. GUM represents Poland in the Metre Convention, co-operates with BIPM and Consultative Committees established by CIPM. GUM is a member of CCRI and CCM, observer at CCOM, participated in the work on establishing CCAUV and committee on flow measurement. GUM participates in activities of some working groups: CCM Working Group on mass standards, CCM Working Group on hardness, CCQM Working Group on pH-metry, CCQM Working Group on gas mixtures and Working Group on nanometrology. Poland signed the Convention establishing the International Organization of Legal Metrology in 1955 and is represented by GUM in this organization. GUM is a member of EUROMET and has its representatives - Contact Persons - in all 11 fields of co-operation and participates in realisation of EUROMET projects. GUM has been an associate member of WELMEC since 1995 and participates in activities of its working groups: WG 2 (directive on non-automatic weighing instruments), WG 6 (prepackages), WG 7 (software in measuring instruments), WG 8 (Measuring Instruments Directive), WG 10 (measuring systems for liquids other than water). In the field of metrology GUM also co-operates with other international and regional organizations such as: EA, ISO, ISO/REMCO, CIE, IEC. GUM will continue collaboration with BIPM either directly or through regional organizations such as EUROMET, WELMEC, COOMET. The programme of international comparisons for the coming years will be subject of watchful analysis and international co-operation in this field will be run in accordance with the MRA. The Polish administration of measures (GUM as well as regional and local verification offices) is engaged in activity allowing to react promptly and effectively to the needs of industry and economy in the area of metrological services.
The laboratories of GUM and regional and local verification offices are performing metrological control for the Polish industry and users. The situation in respective areas of industrial metrology comprised by this Phare project is as follows:

- **Gas measurements**
  - Users of gas meters
    - accuracy of gas meters indications allowing gas supplies to be proper calculated, but not exceeding the maximum permissible error established in the directive,
    - changes of the accuracy during gas meters operation shall be as small as possible. They are to be tested in the way described in the directive and shall not exceed the error change limit established in the directive.
  - Manufacturers of gas meters
    - testing gas meters prototypes shall fulfil the requirements laid down by the EEC directive,
    - new construction of gas meters may be tested on test rigs in local verification offices in cooperation with industry.

- **Mass measurements**
  As there are not accredited laboratories in the field of mass measurement in Poland yet, the administration of measures renders services for industry concerning calibration of the weighing instruments and weights. These instruments should be calibrated with proper accuracy and should ensure traceability to the national standard in accordance with the hierarchy scheme. This project will ensure the realisation of the hierarchy scheme in the area of mass measures with required – also by industry - accuracy.

- **Hardness measurements**
  The administration of measures performs calibration of hardness standards used in industry. This calibration permits the assignment of hardness standards indications with national standard and meets the international rules requirements. The administration of measures in Poland does not have Brinell hardness measuring installation so it is not able to perform measurements with relevant accuracy required by industry.

- **Electrical energy measurements**
  Calibration of standard meters is performed during:
  - utility meters manufacturing,
  - utility meters testing carried out by electrical energy supplier in the place of installation of a meter,
  - utility meters testing at verification laboratories,
  - testing standard meters used by regional verification offices.

  To satisfy these needs there are necessary:
  - better comparator and equipment for standard meters testing in relevant reference conditions (power supply, climatic),
  - standard meters for regional verification offices for supervision of laboratories,
  - equipment enabling testing of comparator with providing traceability and reference to Josephon standard (voltage unit), for example: voltage dividers, calibrators, standard resistors.

  Co-operation of the administration of measures with industry is also connected with:
  - training staff for measuring laboratories (as a step towards accreditation),
  - providing with opinions on procedures worked out by the laboratories applying for accreditation.

- **Physical and analytical chemistry**
  State administration of measures provide industrial laboratories with certified reference materials (CRMs) traceable to national or primary standards. Almost all branches of industry (chemical, food, petrochemical, alcohol-distilling and brewing, pharmaceutical and cosmetics, coal and salt mining, iron and steel, power and engineering industries as well as agriculture) are interested in such services and also in calibration of the measuring instruments used in their laboratories.

  GUM offers industrial laboratories information services on reference materials using International Data Base COMAR.

  GUM is going to focus more of its activities on the co-operation with industry to become a very important partner in this field. The list of measuring instruments subject to the duty of metrological control relating to type approval and verification is being continuously updated. The numbers of types of measuring instruments subject to the duty of type approval and instruments subject to verification have been reduced. The binding ‘Law on conformity assessment and accreditation’ of April 28, 2000 allows for the establishment of a conformity assessment system in Poland compliant with the system used in the EU. The prepared draft ‘Law on Measures’ will allow for performing verification by accredited laboratories and
manufacturers in those areas where it will be possible and necessary. This project comprises very important domains of the Polish economy. The Polish administration of metrology focuses on the development of these domains all time to ensure the protection of customers and trust between parties in transactions (e.g. examination of weight and balances used in trade and industry, examination of gas meters and electrical energy meters used by households and industry). ‘The guiding-thematic plan of tasks’ for the next year is prepared at GUM every year. This plan contains the tasks ensuring realization of responsibilities defined in the Parliament Act of April 3, 1993 on the establishment of the Central Office of Measures, the Parliament Act of April 3, 1993 - Law on Measures, the Parliament Act of April 3, 1993 – Hallmarking Law and the Regulation of the Council of Ministers of December 29, 1993 on the detailed scope of activities of GUM as well as the principles of establishment and scope of activities of the regional and local verification offices and regional and local assay offices. The plan describers among others the essential tasks relating to legal units of measures, standards of units of measures, metrological regulations and examination instructions, metrological control of measuring instruments and the tasks within international co-operation and training. The Central Office of Measures, from its establishment in 1919, has been looking after the measurement standards in its custody and continuously upgrading them. The national standards of units of measures in Poland are connected with the international standards and the world system of the national standards which is co-ordinated by BIPM. The measuring instruments used on the territory of Poland are referred to the national standards of units of measures used and stored at GUM. The measurement standards at GUM as well as the measuring instruments or measuring installations are also used by neighbouring countries like: Lithuania, Belarus, Ukraine and other countries from the former Soviet Union. The co-operation of GUM with neighbouring countries is growing. It should be underlined that Poland co-operates widely with administrations of measures and NMIs from Western Europe in the area of metrology and shares its experience and knowledge with the countries from Central and Eastern Europe. The Polish administration of measures is willing to keep all those measurement standards it has now and is also interested in buying or building new ones while having enough financial resources. There are quite big funds from state budget allocated for metrology in Poland but, unfortunately, they are not sufficient to fulfil all requirements of the EU legislation. The Polish metrology is looking for support in investment to strengthen the regulatory infrastructure needed to ensure compliance with the acquis. That is the reason why GUM is seeking Phare assistance.

Gas volume measurements
Gas meters belong to a group of utility meters. Taking into consideration 40 million population of Poland and former central system of economy demanding the usage of natural gas for domestic purposes it is understandable why millions of gas meters are in operation in Poland. Number of applications for gas meters type approvals increases year by year. Since 1996 domestic gas meters have been subject to subsequent verification in Poland so a large number of measurements for testing and verification of various gas meters have to be effectively covered by the Polish administration of measures. Poland is obliged to implement Council Directive 71/318/EEC of 26 July 1971 on the approximation of the laws of Member States relating to gas volume meters - as a part of acquis communautaire in the field of legal metrology. In accordance with this directive gas meters shall be approved and verified before putting on the market. In type examination some tests were not carried out by the Polish administration of measures neither at the Central Office of Measures nor at regional verification offices up to now, i.e. endurance tests. After endurance test meters must satisfy special requirements which could be checked by using reference standard. As the consequence of the requirements of this directive the necessity appears to construct special endurance testing rigs and reference standards (bell provers) for gas meter performance tests before and after endurance test. Four special rigs of different size should be constructed for endurance tests of gas meters with deformable walls (membrane gas meters), gas meters with rotary pistons and turbines. For performance tests two bell provers of different size should be purchased. The realisation of this additional obligation by the Polish administration of measures requires large financial outlay, which cannot be fully covered from the state budget. Process of designing these testing rigs has just started and it is financed from the national resources. Phare funds for financing the construction of the test rigs as well as for purchasing reference standards will ensure the implementation of the directive on time.

Mass measurements
GUM is obliged to implement the requirements of 74/148/EEC Directive by the end of the year 2002. The realisation of this obligation requires large financial funds (773 100 EUR), which can not be wholly covered from the state budget. Financing the part of these needs by Phare fund
will ensure the implementation of this Directive in time. The requirements of 74/148/EEC Directive have been implemented at GUM systematically since 1975. Hierarchy scheme of instruments for mass measurements realised in accordance with the provisions of this Directive ensures the traceability from national standard of the unit of mass to the measuring instruments (weights and balances) used in trade and industry (commercial transactions, free movement of goods). It was set up that the following measuring installations would be built or modernized:

- for testing the mass standards and weights of the accuracy class F₂, M₁ and M₂ (F₁, F₂, M₁ mass standards and proper balances) – at local verification offices; it has been realized thanks to budgetary funds and the Phare funds within the Project PHR 090 060 020 004 ‘Development of the Foreign Trade Infrastructure’,
- for testing the mass standards and weights of the accuracy class E₁ and E₂ (E₁ mass standards and proper balances) – at GUM; it has been wholly realized from the state budget,
- for testing the mass standards and weights of the accuracy class F₁ (E₂ mass standards and proper balances) – at the regional verification offices; the needs related to the testing of the mass standards and weights of the accuracy class E₂ and F₁ of nominal values of 20 kg and 50 kg will be financed from budget by the end of the year 2002. It is also possible to provide regional verification offices with the mass standards of the accuracy class E₂ from 1 mg to 50 kg.

Taking into account fact that the requirements of the Directive should be implemented by GUM by the end of 2002 it is necessary to find other sources for financing the following needs:

- purchase of the mass comparator-balances which will make it possible to test the mass standards and weights of the accuracy class F₁ from 1 mg to 10 kg at the regional verification offices and of the accuracy class E₂ from 2 kg to 10 kg at GUM,
- modernising and air-conditioning the GUM laboratory in which the mass standards and weights of accuracy class E₁ and E₂ are tested.

Financing these activities from the Phare funds will be very helpful in realisation of the last step of GUM’s plans as well as will enable GUM to implement the requirements of 74/148/EEC Directive. The realization of this undertaking as a whole will make it possible to achieve the proper accuracy of testing the mass standards and weights used in trade and industry (free movement of goods) as well as ensure the proper realization of the whole hierarchy scheme of testing the instruments for mass measurements. It is also significant for another derived quantities as force, pressure, density and so on. The equipment owned by the Mass Measurements Laboratory at GUM is used not only for the needs of the Polish market but also for testing and calibration of the mass standards of accuracy class E₁ and E₂ submitted by the countries that emerged after the dissolution of the USSR. GUM is going to continue this collaboration and is ready to meet the needs of neighbouring countries using its new and modernised measuring installations for testing the mass standards and weights from 1 mg to 50 kg of all classes of accuracy. GUM takes part in the international comparisons within COOMET and EUROMET. The aim of the above tasks was to ensure not only traceability at the regional and local verification offices, but also high quality service for the increasing needs and requirements of industry. In 1999 the following number of mass standards and weights for industry were tested at GUM and at regional and local verification offices:

- E₂ – 1848,
- F₁ – 15562,
- F₂ – 8791,
- M₁ – 113286,
- M₂ – 142175.

Besides the measuring instruments mentioned above, all weighing instruments submitted by industry and trade were verified and calibrated by GUM as well as regional and local verification offices.

### Hardness measurements

The need for creating Brinell standard measuring installation was envisaged in the GUM’s investment plans but because of lack of funds it could not be fulfilled. The Brinell standard measuring installation together with operating at GUM Rockwell and Vickers standard ones will make a basic complete set for metal hardness measurements. The new measuring installation enables GUM to make calibration of Brinell hardness blocks in compliance with EN 10003-3. These blocks will be the reference blocks at accredited laboratories for testing hardness equipment for industry. The Brinell standard measuring
installation will play the basic role in evaluation of Brinell hardness uncertainty at GUM during the process of introducing the quality system and transferring hardness unit to industry as well as in the co-operation with some countries of the former Soviet Union not having their own standard measuring instruments (especially Ukraine and Belarus).

**Electrical energy measurements**

The main goal of the project of electrical energy measurements domain is the implementation of the procedures for the electrical energy meters type approval in full range of requirements in accordance with the new Measuring Instruments Directive (MID). In this connection the modernisation of the type approval laboratory as well as the development of measuring standards system for calibration of utility electrical energy meters are necessary. Financial support will enable attaining by the GUM’s laboratory the technical level comparable to that of the EU as well as make it possible to compete for the status of the Polish notified body. GUM is preparing itself for adopting of the Measuring Instruments Directive (MID) which sets new requirements in the field of legal metrology. During verification of measuring instruments under this directive GUM will encounter new tasks and challenges. In the area of metrology concerning electric energy meters GUM would like to attain the highest technical level. The future activity of GUM will depend not only on up-to-dated equipment at its laboratories but also on its place in the whole system of conformity assessment. GUM should elaborate its position and methods of co-operation with accredited laboratories, industry and other governmental bodies. The Phare 2001 programme should help GUM to achieve this goal. Polish industry submits to GUM its growing needs for type approval of electric energy meters. In order to meet these needs GUM has to make investments. The main needs for investment are presented in chapter 5. The following national standards in the field of electricity: electrical voltage, resistance and capacitance, are maintained at GUM now and GUM decided that they will be maintained in the future. Such decision results from current technical possibilities of GUM. At present the voltage standard is based on primary standard (Josephson), but the resistance and capacity standards are based on the secondary standards (group of standard resistors and capacitors).

In the future the installation of the second primary standard based on Quantum Hall Effect is planned. GUM co-operates with PTB in Germany in the area of measurement standards.

**Density and surface tension measurements / Gas mixture measurements**

In the field of physicochemical and chemical metrology GUM maintains national or primary standards for the following quantities: density, viscosity, humidity, pH, refractive index, optical rotation, and amount of substance (gas analysis). All of these standards (except that of humidity) are used for the certification of reference materials (CRMs) which are indispensable for executing metrological control of measuring instruments and are delivered to Polish and foreign customers for calibration of their own measuring instruments. CRMs are directly traceable to the national or primary standards, so it is necessary for GUM to maintain these standards for technical and organisational reasons. CRMs for humidity measurements are not prepared at GUM. Nevertheless, the hierarchy scheme of measuring instruments in this case is very ‘flat’, so maintenance of primary standard is reasonable. In the field of the physicochemistry and chemistry GUM does not use national standards from institutions outside of Poland for metrological purposes. The Polish national and primary standards participate in international, regional and bilateral comparisons (CCQM BIPM, CCM BIPM, EUROMET, PTB – Germany, CMU-Slovakia, Cannon/ASTM – U.S.A. etc.) Some Polish standards were used for calibration of foreign standards (Slovakia, Lithuania).

**Quality system**

Very important issue within GUM is at the moment the development and implementation of a quality management system. This is an urgent need which stems from the system of mutual recognition of national measurement standards and of the calibration and measurement certificates based upon those standards, that is under development in the framework of the Mutual Recognition Arrangement (MRA) agreed in 1999. GUM started preparing documentation and implementation of the quality management system at its divisions and in regional verification offices in accordance with the requirements of the MRA. The quality system manager was appointed by the President of GUM on 1 July 2000. There was also set a team of people from all divisions of GUM and regional verification offices responsible for the quality management system. This quality management system will meet the requirements of standard ISO/IEC 17025 and for administration part – ISO 9001:2000. GUM is preparing the QS implementation under The Netherlands Programme for Co-operation with Central and Eastern European Countries (PSO/PL/9/1) which should start in January 2001 and will be closed after 24 to 30 months. Quality management system will be implemented under PSO project up to the level of pre-audit. Pre-audit of quality system will be performed by a number of auditors from the contractor of PSO not involved in the implementation of the quality system. This fact qualifies the GUM’s quality management system for a
self-declaration that is an acceptable method under the technical rules of the MRA and could be reviewed and accepted by a regional metrology organisation, like EUROMET.

3.2 LINKED ACTIVITIES

The following activities were already undertaken: amendment of the Law of Measures, revision of the metrological regulations according to directives provisions, and adopting methods relevant to European directives in the Polish test procedures. Some activities relating to mass and weight standards have been carried out since 1975. Under the project PHR 090 060 020 004 ‘Development of the Foreign Trade Infrastructure’ (years: 1987 – 1993) GUM as well as regional and local verification offices have been equipped with the sets of mass standards, balances, weights. The electrical energy meters laboratory at GUM had been already modernized in the framework of EC PHARE Programme No. P9012 ‘Standards and Measures’ (Subproject – “Equipment”). Activities under this subproject were carried out during period 1994-1995. The laboratory was equipped with the measuring set for electrical energy meters calibration and partially for type approval tests; nowadays this equipment is not sufficient any longer; also partial amendment of the metrological regulations in accordance with directive 76/897/EEC was made by now. This project will be a continuation of the part of the Country Operational Programme PHARE’97 ‘Harmonisation of the Polish Metrology Law’ which was signed on 19th December 1997 as the inter-governmental agreement between European Commission and the Office of the Committee for European Integration. The Polish side received support from British experts under the PHARE’97 programme in preparing amendments to the Law on Measures, in order to make this law consistent with the EU metrology directives. The programme ended in October 2000. This new Law on Measures is intended to transpose or to be the basis for transposition of the current package of EC metrological regulations and directives.

In 1999 ‘The PRAQIII Report – Metrology in Poland’ was prepared under the Regional Programme on Quality Assurance PRAQIII by the EU expert. This Report contains conclusions and recommendations concerning: organisation, legal metrology, scientific metrology, dissemination of units, establishment of traceability, policy of the development of metrology. The Central Office of Measures takes these assessments and recommendations into account and uses them to the Polish metrology advantage. A current state of the national standards of units of measures and best measurement capabilities was reviewed. All GUM’s standards were mentioned in the PRAQIII report. GUM considers all its standards desirable, because they are participating in international comparisons with very good results.

GUM is one of the beneficiary institutions of the PHARE’99 Project 3.1.: ‘Certification and standards’- twinning component PL99/IB/EC/1 ‘Structures and systems for certification and standardisation on the EU Single Market’. The strategy aim of the PHARE’99 project was to approximate the Polish system of conformity assessment and technical regulations for industrial products to that of the European Union. It will enable Poland to fulfil the requirements of the UE Single Market and remove barriers in trade. Thanks to this project GUM is upgrading its capabilities in metrology and testing laboratories in the area of non-automatic weighing instruments’ assessment in accordance with the provisions of the new approach directives 90/384/EEC and 93/68/EEC. GUM will receive support from French expert relating to the EU directives on automatic weighing machines, enabling GUM to become a designated body in the conformity assessment of these instruments. Activities in the framework of the Twinning covenant began in September 2000. The twinning budget of the covenant does not include the investment part of the project. Thus the lumping of calls for tenders and the procurement of equipment and goods identified as needs within the twinning project are not the responsibility of the Member States within the covenant but will be subject to standard Phare procedures (Investment Funds). The date of the realisation of the investment has not been set up. In the Phare’99 project GUM submitted a request for purchase of comparator of mass 1000 kg as well as standard weights 500 kg and 1000 kg (for amount 0.1150 MEUR) as equipment for the regional verification office. The strategy declared in the project PHARE’99 will be continued in the project PHARE 2001 to obtain full capability in testing of non-automatic weighing instruments and to complement the existing measuring installations used for mass standards calibration. The PHARE 2001 project gives emphasis to training specialists and activities in the area of technical infrastructure, which is the continuation of assumptions of the previous project.

GUM will be one of the beneficiaries of the Phare 2000 project co-ordinated by the Ministry of Transport and Maritime Economy in the part relating to the legal metrology aspect of the acquis on tachographs.

3.3 RESULTS /OUTPUTS

Implementation of EC directives and European standards to the Polish law permits to fulfil requirements for accession to the EU (metrological legal regulations and technical regulations prepared); improvement of technical abilities of the Polish administration of measures – that it will resemble those of National
Metrology Institutes in the EU (laboratories of the Polish administration of measures equipped with necessary devices); and qualified personnel at the Central Office of Measures and regional administration of measures. The expected result of the project is to facilitate technical collaboration and create opportunities for wider international multilateral co-operation. It will remove trade barriers and increase technical safety of products.

The following outputs will be achieved by the end of the project: implementation of 7 directives and 10 European standards; building new measuring installations at the Central Office of Measures (10) and nine regional verification offices (30); completion of equipment in existing measuring installations; preparation of 70 gas standards and 70 liquid standards per year; trained personnel at the Central Office of Measures and at nine regional verification offices (650 people – 25 seminars and training courses); issuing 20 new regulations in the metrology; and type approval for new types of measuring instruments – especially important for petrochemical and spirit industries, for mines and living quarters. Study visits may be part of the project.

3.4 ACTIVITIES

In order to implement 7 directives and 10 European standards mentioned in chapter 3.1 and to achieve outputs provided for in chapter 3.3 the following activities are needed:

1. Infrastructure investment (purchase of equipment and building the measuring installations): construction of the endurance testing rigs and reference standards (bell provers); building the measuring installations for calibration of mass standards and weights of nominal value up to 50 kg; building the Brinell hardness standard measuring installation; providing the electrical energy meters laboratory with reference measuring standards for calibration and with devices for the type approval examination; building the density and surface tension reference installations; and construction of the national standard of gas mixtures for the environmental and labour conditions protection.

2. Technical assistance relevant to the infrastructure investment:
   • training the personnel of GUM and 9 regional verification offices relating to: implementation of metrological regulations and procedures for metrological control harmonized with the relevant EC directive (study visit and elaboration of a draft regulation); implementation of endurance test procedures for gas meters; implementation of test procedures for mass standards and weights up to 50 kg; connected with the Brinell hardness standard measurement; implementation of type approval procedures in the range of electrical energy meters; implementation of directives provisions in the field of density and surface tension; implementation of traceability of measurements for the environmental and labour conditions protection.
   • procurement of the software for the measuring installations for calibration of mass standards and weights,
   • installation of the laboratory conditioning,
   • translation of documents and implementing changes in legislation.

3. Investing in human resources: training - for the staff of the Central Office of Measures and of the regional offices ( imparting knowledge and experience of the EU countries on the implementation of EC law in the field of metrology).

4. Light twinning – experts’ assistance in purchasing equipment and building of the measuring installations (see Annex 5).

Ad. 1. Under this Phare programme the following measuring installations will be constructed or modernised: endurance test rig for membrane gas meters with reference standards (bell provers) – at the local verification office in Gdynia; endurance test rig for rotary piston and turbine meters – at the local verification office in Kalisz; measuring installation for calibration of mass standards and weights of E2 class of accuracy from 10 kg to 50 kg – at GUM; measuring installation for calibration of mass standards of E1 class of accuracy from 100 kg to 1 kg – at GUM (modernising); measuring installation for calibration of mass standards and weights of F1 class of accuracy from 50 g to 500 g – at 6 regional verification offices; measuring installation for calibration of mass standards and weights of F1 class of accuracy from 50 to 500 g – at 6 regional verification offices; measuring installation for electrical energy meters testing – at GUM; measuring installation for EMC testing – at GUM; measuring installation for units transferring – at GUM (modernising); pycnometer for verification of the flow density meters – at GUM; tensiometer for verification of the surface tension liquid standards – at GUM; and also primary gas standard will be created and national gas standard will be established.
Ad 2. The activities envisaged under the project will include the following training, educational programmes: study visit to familiarise with the legal metrology infrastructure and EC directives – harmonised metrology legislation in the West European countries (1 person – 0.040 MEUR); study visit – realisation of indurance tests of gas meters - of diaphragm, rotary piston, turbine and electronic types- at accredited laboratories in gas companies on the territory of EU Member States (4 people – 0.090 MEUR); training on testing procedures for mass standards and weights of the accuracy class $E_1$, $E_2$ and $F_1$ in accordance with recommendation OIML R 111 – in PTB or NPL (12 people); training on operating of the bought balances – at producer premises (2 people); training related to the software for measuring installations used for testing the mass standards and weights – in Poland by software producer (12 people); training on the operating and testing measuring installation for calibration of Brinell hardness blocks standards – by producer of measuring installation and software producer (3 people – 0.0040 MEUR); training on full-scope electricity meters tests in accordance with IEC and EN standards – at GUM (4 people); training on modern technology and manufacturing organisation of the electricity meters – at GUM (4 people); courses on quality system in accordance with ISO/IEC 17025 standard – at GUM and at regional verification offices (20 people); courses on statistic methods of verification of electricity meters – at GUM (4 people); study visit – metrological rules and legal metrology documents being used in chosen EU countries – analyse and comparison of the Polish and EU rules of electricity meters – for GUM and 9 regional verification offices (12 people); study visit – current structure and prognosis for future demand of EU manufacturers on type approval and verification – rational prognosis for the metrological service network in Poland – for GUM and 9 regional verification offices (12 people); training on using the pressure pycnometer – in the U.K. (2 people – 0.00140 MEUR); training on using methanometers and explosimeters in BAM, Germany (2 persons – 0.0030 MEUR); training on preparing gas standards for environmental and labour protection at NMI, The Netherlands or BAM, Germany (3 people – 0.00450 MEUR); visit of expert to GUM – preparing measuring installation for metrological examination of explosimeters and methanometers – at GUM (0.010 MEUR). estimated cost of these 3 training – 0.1510 MEUR.

Ad 3. Training will be provided for the management of GUM, chief metrologists as well as the regional and local verification offices (150 people – 320 MEUR). Topics of training: evolution of EU legislation and practical approximation of law, particularly on harmonization of the EU Member States law with the requirements of new approach directives; implementation of EU directives related to measuring instruments in the EU Member States (including directives: 90/384/EEC - non-automatic weighing instruments, 93/42/EEC - medical devices, draft Measuring Instruments Directive); activities of national administration of measures in the EU Member States in the system of horizontal old approach directives and new approach directives relating to measuring instruments.

4. INSTITUTIONAL FRAMEWORK
Project includes the Central Office of Measures (GUM) in Warsaw and 9 regional verification offices (OUM). The Central Office of Measures (GUM) is responsible for overall co-ordination and supervision of the project. The project will not anticipate changes in the institutional framework. The basic task of GUM in the field of metrology is to ensure the mutual conformity and the required accuracy of the results of measurements carried out in Poland and their compliance with the international measurement system. The required accuracy corresponds to the present needs of research, technology and trade as well as health and environmental protection. The equipment purchased under this project become Central Office of Measures’ and nine regional verification offices’ property.
### 5. DETAILED BUDGET (EUR)

<table>
<thead>
<tr>
<th>PHARE Support (MEUR)</th>
<th>Investment Support</th>
<th>Institution Building</th>
<th>Total PHARE</th>
<th>National Cofinancing</th>
<th>IFI</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purchase of equipment and building the measuring installations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- construction of the endurance testing rigs and reference standards (bell provers)</td>
<td>1.2761</td>
<td></td>
<td>1.3449</td>
<td>0.56310</td>
<td></td>
<td>1.90800</td>
</tr>
<tr>
<td>- building the measuring installations for calibration of mass standards and weights of nominal value up to 50 kg</td>
<td>0.4260</td>
<td></td>
<td>0.4260</td>
<td>0.34710</td>
<td></td>
<td>0.77310</td>
</tr>
<tr>
<td>- creation of Brinell hardness standard installation</td>
<td>0.1000</td>
<td></td>
<td>0.1000</td>
<td>0.01000</td>
<td></td>
<td>0.11000</td>
</tr>
<tr>
<td>- providing the electrical energy meters laboratory with reference measuring standards for calibration and with devices for the type approval examination;</td>
<td>0.3056</td>
<td></td>
<td>0.3056</td>
<td>0.01000</td>
<td></td>
<td>0.31560</td>
</tr>
<tr>
<td>- building the density and surface tension reference installations,</td>
<td>0.1705</td>
<td></td>
<td>0.1705</td>
<td>0.05500</td>
<td></td>
<td>0.22550</td>
</tr>
<tr>
<td>- construction of the national standard of gas mixtures for the environmental and the labour conditions protection</td>
<td>0.0640</td>
<td></td>
<td>0.0640</td>
<td>0.07350</td>
<td></td>
<td>0.13750</td>
</tr>
<tr>
<td>- Light twinning – Experts assistance in purchasing of equipment and building the measuring installations</td>
<td></td>
<td>0.0688</td>
<td>0.0688</td>
<td></td>
<td></td>
<td>0.06880</td>
</tr>
<tr>
<td><strong>Technical assistance relevant to the infrastructure investment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- implementation of metrological regulations and procedures of metrological control harmonized with relevant EC directive (study visit and elaboration of a draft regulation)</td>
<td>0.4039</td>
<td></td>
<td>0.4039</td>
<td>0.04868</td>
<td></td>
<td>0.45258</td>
</tr>
<tr>
<td>- implementation of endurance test procedures for gas meters (training),</td>
<td>0.0400</td>
<td></td>
<td>0.0400</td>
<td>0.01000</td>
<td></td>
<td>0.05000</td>
</tr>
<tr>
<td>- implementation of test procedures of mass standards and weights up to 50 kg, (training and software),</td>
<td>0.1510</td>
<td></td>
<td>0.1510</td>
<td>0.02800</td>
<td></td>
<td>0.17900</td>
</tr>
<tr>
<td>- training connected with the Brinell hardness standard measurement (training),</td>
<td>0.0040</td>
<td></td>
<td>0.0040</td>
<td>0.00700</td>
<td></td>
<td>0.01100</td>
</tr>
<tr>
<td>- implementation of type approval procedures in the range of electrical energy meters (training, installation of the laboratory conditioning),</td>
<td>0.1000</td>
<td></td>
<td>0.1000</td>
<td></td>
<td></td>
<td>0.10000</td>
</tr>
<tr>
<td>- implementation of directives provisions in the field of density and surface tension (training),</td>
<td>0.0014</td>
<td></td>
<td>0.0014</td>
<td>0.00368</td>
<td></td>
<td>0.00508</td>
</tr>
<tr>
<td>- implementation of traceability of measurements for the environmental and labour conditions protection.</td>
<td>0.0175</td>
<td></td>
<td>0.0175</td>
<td></td>
<td></td>
<td>0.01750</td>
</tr>
<tr>
<td><strong>Investing in human resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- training imparting knowledge and experience of the EU Member States</td>
<td>0.2512</td>
<td></td>
<td>0.2512</td>
<td>0.08000</td>
<td></td>
<td>0.33120</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1.2761</td>
<td></td>
<td>0.7239</td>
<td>2.0000</td>
<td>0.69178</td>
<td>2.69178</td>
</tr>
</tbody>
</table>

The co-financing funds will be available.

Phare investment support will be appropriated for purchasing the following measuring instruments and equipment:

- balance-mass comparator Max \( \geq 20 \text{ g } d = 0.001 \text{ mg, } s \leq 0.002 \text{ mg} \) for 6 regional verification offices - (0.0750 MEUR)
- balance-mass comparator Max \( \geq 500 \text{ g } d = 0.01 \text{ mg, } s \leq 0.02 \text{ mg} \) for 6 regional verification offices - (0.0870 MEUR)
- balance-mass comparator Max \( \geq 10 \text{ kg } d = 0.1 \text{ mg, } s \leq 0.25 \text{ mg} \) for GUM (0.0750 MEUR)
- air-conditioning & modernisation of laboratory room (checking mass standards accuracy class); for GUM (0.096ME)
- measuring installation for calibration of Brinell hardness blocks standards for GUM (0.10 MEUR)
- 3-phase standard meters for 4 regional offices (0.050 ME)
- Calibrator 4808 Wavelet for GUM (0.0630 MEUR)
- Resistance standard 742 A Fluke for GUM (0.020 MEUR)
- pressure pycnometer for GUM (0.1250 MEUR)
- termostats for GUM (0.0080 MEUR)
- 100 Cylinders for standard gas mixture for GUM (0.040ME)
- 2 Oilless vacuum pumps for GUM (0.0240 MEUR)
- 2 Oilless vacuum pumps for GUM (0.0240 MEUR)
- endurance test rig for membrane gas meters with reference standards (bell provers) and endurance test rig for rotary piston and turbine meters for local verification offices (0.210 MEUR).

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PL01.02.02 – Metrology – p.10
6. IMPLEMENTATION ARRANGEMENTS

6.1 IMPLEMENTING AGENCY
PAO: Mr. Pawel Samecki – Undersecretary of State at the Office of the Committee for European Integration. Al. Ujazdowskie 9, 00-918 Warszawa, Poland. tel.: (+48 22) 455 52 41.
CFCU (Central Financing and Contracting Unit): Foundation “Co-operation Fund”, ul. Nowy Swiat 6/12, 00-400 Warszawa, Poland. CFCU – as an implementing agency under the overall responsibility of the PAO - is responsible for handling tenders, contracting and payments of contracts on behalf of the Central Office of Measures which itself shall be responsible for preparing projects and managing their technical implementation.


6.2 TWINNING
Light twinning applied to investment support as ‘Experts’ assistance in purchasing of equipment and building the measuring installations’ (visits of 7 experts in metrology in Poland; additional costs requested for Phare financing – 68,800 EUR) – see Annex 5.

6.3 NON-STANDARD ASPECTS
The DIS Manual will strictly be followed in contract/tender procedures.

6.4 CONTRACTS
The entire project will be implemented by means of three contracts:
Contract 1 - purchase of equipment and building the measuring installations (1.3449 MEUR),
Contract 2 - technical assistance relevant to the infrastructure investments (0.4039 MEUR),
Contract 3 - investing in human resources (0.2512 MEUR).

7. IMPLEMENTATION SCHEDULE
7.1 START OF TENDERING/CALL FOR PROPOSALS: IVQ2001
7.2 START OF PROJECT ACTIVITY: IQ2002
7.3 PROJECT COMPLETION: IVQ2003

8. EQUAL OPPORTUNITY
Participation of men and women in the project will be based on the relevant standards of the EU and will be ensured by official announcements published in order to recruit the personnel needed for the project execution. The main criteria for staff recruitment will be appropriate qualifications and experience in similar projects, not sex or age. Both men and women will have equal opportunities and salaries.

9. ENVIRONMENT
There is no bad influence on the environment. These projects allow reliable environmental monitoring.

10. RATES OF RETURN n.a.
11. INVESTMENT CRITERIA n.a.

12. CONDITIONALITY AND SEQUENCING
Implementation of the project requires:
1. passing the new Law on Measures by Parliament and issuing regulations on metrological rules concerning subjects mentioned in this project – not later than the end of 2002,
2. unifying the relevant technical requirements between Poland and EU,
3. providing administration of measures with equipment (should be finished before the end of 2002),
4. training of the staff of the central and regional administration of measures.
This project needs:
- acceptance of the costs of the project in the financial plan of the Central Office of Measures (2001-2002),
- tender for contracts for purchasing a proper equipment (2002),
Conditionalities:
• The strategy from Phare’99 relating to metrology will be taken into consideration.
• In accordance with the Polish Position in free movement of goods' chapter the directives, mentioned in this project, will be adopted in the Polish law in the forth quarter of 2002 (coming into force on 1 January 2003). No investment contracting will take place before the adoption has been done.
• Organisation will be in place and necessary personnel available, before investments can be contracted..
• The co-financing funds for the project implementation will be available.
According to the recommendations of the European Commission this project is to be the last one in the field of metrology.
## ANNEX 1: LOGICAL FRAMEWORK MATRIX

**Date of drafting:** 5.03.2001

**End Contracting:** 15/12/2003 - **End Disbursement:** 15/12/2004

### Project number: Project title: Metrology

**Total budget of project**
- **Total EUR:** 2 691 780
- **Phare EUR:** 2 000 000

### Wider objective

<table>
<thead>
<tr>
<th>Indicators of Achievement</th>
<th>Sources of information</th>
<th>Assumptions and Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementing 7 directives (71/316/EEC, 71/318/EEC, 74/148/EEC, 76/891/EEC +82/621/EEC, 76/765/EEC, 76/766/EEC) and 10 European standards (EN 10003-3, EN 50054 – 50058, EN 4544-1 – 4544-4). Issuing of regulations on legal metrology; Implementing the procedures for testing of gas meters in compliance with the directive 71/318/EEC; Harmonization of the Polish regulations with UE acts in the field of legal metrology, free movement of measuring instruments and metrological service; Implementation of the European standards to metrological control in hardness measurements; Calibration of Brinell hardness blocks; International comparisons of Brinell hardness blocks; Role of the notified body in the range of electrical energy meters type approval; International comparisons and co-operation with National Metrology Institutes in Member States of EU; Results of international comparisons (EUROMET, CCQM, bilateral)</td>
<td>Regular Report from the Commission on Poland’s progress towards accession, Report on the realization of NPAA, experts’ reports, reports on implementation of this Phare project.</td>
<td>Lack of possibilities for implementation of all provisions of seven directives and ten European standards.</td>
</tr>
</tbody>
</table>

### Immediate Objectives

<table>
<thead>
<tr>
<th>Indicators of Achievements</th>
<th>Sources of information</th>
<th>Assumptions and Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuing of draft regulation on legal metrology control, Increasing number of EC type approvals for gas meters, Working out of new metrological requirements and manual instructions for mass standards and weights meeting the requirements of the directives 74/148/EEC and 71/317/EEC, Offering equivalent and compatible to the EU metrological service concerning type approval, Establishing the metrological control in the field of the density and surface tension measurements, Implementation of new metrological procedures in laboratories and improvement of metrological traceability, Achieving better results in calibration of mass and weights standards carried out in the modernized laboratories.</td>
<td>reports of the comparisons (made in EUROMET, CCQM, bilateral co-operation) reports from the participants, information and data received from the Central Office of Measures</td>
<td>Lack of funds for investments in infrastructure. Lack of provisions of necessary equipment on time. Lack of proper legal regulations.</td>
</tr>
</tbody>
</table>
Results/Outputs | Indicators of Achievement | Sources of information | Assumptions and Risks
---|---|---|---
Implementation of EC directives and European standards to the Polish law permits to fulfill requirements for accession to the EU (metrological legal regulations and technical regulations prepared), improvement of technical abilities of the Polish administration of measures — that it will resemble those of National Metrology Institutes in the EU (laboratories of the Polish administration of measures equipped with necessary devices), well qualified personnel at the Central Office of Measures and regional verification offices - building of new measuring installations: in GUM (10) and in regional verification offices (20), issuing new regulations in metrology (30), completion of equipment in existing measuring installations, preparation of 70 gas standards and 70 liquid standards per year, type approval for new types of measuring instruments — especially important for petrochemical and spirit industries, for mines and living quarters, translation of documents and implementing changes in legislation, trained personnel in the Central Office of Measures and in the 9 regional verification offices (650 people – 25 seminars and training courses), number of comparisons and standard calibrations (made in EUROMET, bilateral co-operation), the results of audits in accredited laboratories, information and data from the Central Office of Measures and local verification offices.

Lack of possibilities for implementation of some provisions of the "metrological" directives, lack of completed equipment, lack of proper technical and legal regulations, lack of sufficient number of well trained personnel.

Activities | Inputs | Sources of information | Assumptions and Risks
---|---|---|---
The following activities are needed:
1. construction of the endurance testing rigs and reference standards (bell provers),
2. building the measuring installations for calibration of mass standards and weights of nominal value up to 50 kg,
3. building the Brinell hardness standard measuring installation,
4. providing the electrical energy meters laboratory with reference measuring standards for calibration and with devices for the type approval examination,
5. building the density and surface tension reference installations,
6. construction of the national standard of gas mixtures for the environmental and the labour conditions protection,
7. training and study visits relevant to the six above mentioned investments,
8. implementation of metrological regulations and procedures for metrological control.
9. training imparting knowledge and experience of the EU Member States
Building of measuring installations, Provision with measuring equipment; Imparting advanced knowledge and experience of the EU Member States in the domains of metrology, Study visits in the EU administration of measures; Technical assistance (training of personnel, software, translation, legal changes).

Information and data from the Central Office of Measures and the regional verification offices.

Lack of suitable equipment. Lack of draft regulations. Lack of financial funds in GUM’s budget for years 2002 -2003
# ANNEX 2-4 CUMULATIVE IMPLEMENTATION, CONTRACTING AND DISBURSEMENT SCHEDULE

<table>
<thead>
<tr>
<th>Programme number</th>
<th>Document</th>
<th>Strategic Plan</th>
<th>Section</th>
<th>Version</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</table>

**Project Title**

**METROLOGY**

<table>
<thead>
<tr>
<th>Sub-projects</th>
<th>Implementation Schedule (Quarters)</th>
<th>Budget Allocation Cost Estimate</th>
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</thead>
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<tr>
<td></td>
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<td>PLANNED</td>
</tr>
<tr>
<td>Implementation</td>
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</tr>
<tr>
<td>Contracting</td>
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<td>2</td>
</tr>
<tr>
<td>Disbursement</td>
<td>0.4974 1.0334 1.3474 1.8454 1.993</td>
<td>2</td>
</tr>
</tbody>
</table>

**Date of Drafting**

5.03.2001

**Planning Period**

ANNEX 5 - LIGHT TWINNING

1. Purpose
Experts’ assistance in purchasing equipment and building of the measuring installations – part of the Phare 2001 project ‘Implementation of EC regulations in the field of metrology’

2. Acquis communautaire

3. Contents of the light twinning project
Light twinning may consist in providing by a Member States assistance of experts from National Metrology Institutes and other national institutes in the domains relating to the measurements of the following quantities: gas volume, mass, hardness, electrical energy, density and surface tension as well as gas mixture. This assistance should comprise: drawing up the technical requirements for the measuring instruments to be bought to achieve the result of the project compatible with the acquis communautaire, confronting these technical requirements with the market offers, analysis of technical documentation prepared by GUM for the measuring installations and assessment of the rooms with their utilities relevant for the installation of the measuring instruments, supervision of the course of tenders, and assessment of the technical quality of manufactured or purchased measuring instruments. Below mentioned tasks require the services of specialised experts in metrology through ad hoc or repeated mission pre-programmed to take place at appropriate stage. Experts’ assistance is required in the following areas of metrology:

Gas volume measurements
Suggested expert (A): an expert from the NMI representing the highest level of development in the area of gas volume in flow measurements.

Range of work:
- Evaluation of technical documentation for: endurance test rig for membrane gas meters with reference standards (bell provers) at the local verification office in Gdynia, and endurance test rig for rotary piston and turbine meters at the local verification office in Kalisz.
- Participation in elaboration of ‘Main terms of order’ for: construction of 2 endurance test rigs for gas meters, and purchase of 2 bell provers.
- Assisting in the work of the commission selecting tenders.
- Participation in technical acceptance of work done at construction of: endurance test rig for membrane gas meters with reference standards (bell provers) at the local verification office in Gdynia, and endurance test rig for rotary piston and turbine meters at the local verification office in Kalisz.

Mass measurements
Providing the Mass Standards Laboratory in GUM with air-conditioning. Suggested expert (B): an expert from the EU institution representing the highest level of development in the area of air-conditioning.

Range of work: Recognition of the present conditions and specified needs of the Mass Standards Laboratory in the range of air-conditioning; Working out the technical requirements for air-conditioning equipment; Assessment of technical documentation prepared by GUM; Assistance for choice of offers for equipment; and Supervision of work during the installation and acceptance of the technical reception of the equipment after installation.

Hardness measurements
Providing GUM with Brinell hardness standard machine complying with EN. Suggested expert (C): an expert from the NMI representing the highest level of development in the area of Brinell hardness measurements.

Range of work: Analysis of the manufacturer’s market in hardness testing (standard) machines with ‘closed loop’; Recognition of the possibilities for adaptation of the hardness testing machines to the requirements of EN 100003-3 (for load and measure system); Laying down additional requirements (apart from EN 100003-3) for the hardness standard machine; Indicating the manufacturers of the equipment; Supervising during the successive work stages connected with building of the stand; Acceptance of the technical reception of the equipment after delivery.

Electrical energy meters
Suggested expert (D): an expert from the NMI representing the highest level of development in the area of electrical energy meters. Range of work: Analysis of a present-day situation at GUM and working out new solutions in collaboration with GUM’s experts in relation to reference measuring standards (traceability) system for calibration of electrical energy meters and type approval of electricity meters;
Laying down technical and metrological requirements for measuring instruments to be installed at the laboratory with the identification of their type and procedures for ensuring a traceability chain; Working out documentation on the calibration procedures in accordance with the quality management system.

Gas mixture meters

Suggested experts (E, F): experts from the EU institutions representing the highest level of development in the areas of gas standards for emission and gas standards for imission, (permeation and diffusion method) including legislation for environmental monitoring. Range of work: The support in establishing the national gas standard for environmental protection and the protection of labour conditions, prepared by dynamic methods - emission and imission (the definition of the standard, the documentation which should consist of the certificates of the purity of the components of the standard, the long- and short-term stability of standard); The support in establishing the national gas standard prepared by gravimetric method (the definition of the standard, the documentation, which should consist of the certificates of the purity of the components of the standard, the stability of standard); A conception of the stand for preparing the gas standards by the dynamic method and working out the measurement instructions.

Density and surface tension measurements

Suggested expert (G): an EU expert for valuation of the purposefulness of the purchase of a pressure pycnometer.

4. Results of the light twinning

Gas volume measurements: Opinion on documentation from technical and metrological point of view; Proper elaboration of ‘Main terms of order’; Proper evaluation of tenders; Evaluation of the tasks realisation.

Mass measurements: Providing the Mass Standards Laboratory in GUM with air-conditioning. Properly prepared documentation and choice of proper air-conditioning equipment and of a relevant firm for its installation. Proper parameters of air-conditioning in laboratory rooms where the standard weights classes E₁ and E₂ are tested.

Hardness measurements: Providing GUM with Brinell hardness standard machine complying with EN. Choice of the best solution for providing GUM with hardness standard machine, Technical reception of the equipment with uncertainty determination.

Electrical energy meters: The Polish side will adapt recommendations for: calibration system of electrical energy meters in reference to primary and secondary electrical units standards – volt and ampere, and type approval of electricity meters in accordance with the European directives and standards.

Gas mixture measurements: Elaboration of the national standard's documentation compatible with the EU regulations, Setting up the stand for dynamic method, Ensuring the metrological control of methanometers and explosimeters, Establishing the standards for the environmental protection and the protection of the labour conditions.

5. Provisional budget

<table>
<thead>
<tr>
<th>Action to be undertaken during the twinning project</th>
<th>Implementation</th>
<th>Cost Phare (in EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poland</td>
<td>Phare</td>
</tr>
<tr>
<td>1. Participation of an expert (A) representing the NMI of the highest level of development in the field of gas volume in flow measurements. in Gdansk for 17 working days in total (3 missions: 5 days, 2 days, 10 days):</td>
<td>x</td>
<td>130 x 17 = 2,210</td>
</tr>
<tr>
<td>3 return flights</td>
<td>x</td>
<td>900 x 3 = 2,700</td>
</tr>
<tr>
<td>20 days/per diem</td>
<td>x</td>
<td>230 x 20 = 4,600</td>
</tr>
<tr>
<td>in Poznan for 13 working days in total (3 missions: 4 days, 2 days, 7 days):</td>
<td>x</td>
<td>130 x 13 = 1,690</td>
</tr>
<tr>
<td>3 return flights</td>
<td>x</td>
<td>900 x 3 = 2,700</td>
</tr>
<tr>
<td>15 days/per diem</td>
<td>x</td>
<td>230 x 15 = 3,450</td>
</tr>
<tr>
<td>2. Participation of an expert (B) from the EU institution representing the highest level of development in the area of air-conditioning for 16 working days in total (7 missions: 2 x 3 days, 5 x 2 days):</td>
<td>x</td>
<td>130 x 16 = 2,080</td>
</tr>
<tr>
<td>7 return flights</td>
<td>x</td>
<td>900 x 7 = 6,300</td>
</tr>
<tr>
<td>16 days/per diem</td>
<td>x</td>
<td>230 x 16 = 3,680</td>
</tr>
<tr>
<td>3. Participation of an expert (C) from the NMI representing the highest level of development in the area of Brinell hardness measurements for 15 working days in total (5 missions: 1 x 5 days, 2 x 3 days, 2 x 2 days):</td>
<td>x</td>
<td>130 x 15 = 1,950</td>
</tr>
<tr>
<td>5 return flights</td>
<td>x</td>
<td>900 x 5 = 4,500</td>
</tr>
<tr>
<td>15 days/per diem</td>
<td>x</td>
<td>230 x 15 = 3,450</td>
</tr>
<tr>
<td>4. Participation of an expert (D) from the NMI representing the highest level of development in the area of electrical energy meters for 6 working days in total (3 missions x 3 days):</td>
<td>x</td>
<td>130 x 6 = 780</td>
</tr>
<tr>
<td>3 return flights</td>
<td>x</td>
<td>900 x 3 x 3 = 2,700</td>
</tr>
<tr>
<td>6 days/per diem</td>
<td>x</td>
<td>230 x 6 = 1,380</td>
</tr>
</tbody>
</table>
5. Participation of an expert (E) from the EU institution representing the highest level of development in the area of gas standards for emission for 8 working days in total (2 missions: 3 and 5 days):
   - 2 return flights
   - 8 days/per diem
   - Return flights: $130 \times 8 = 1,040$
   - Per diem: $230 \times 8 = 1,840$
   - Total cost for 2 missions: $1,040 + 2 \times 1,840 = 4,720$

6. Participation of an expert (F) from the EU institution representing the highest level of development in the area of gas standards for emission for 8 working days in total (2 missions: 3 and 5 days):
   - 2 return flights
   - 8 days/per diem
   - Return flights: $130 \times 8 = 1,040$
   - Per diem: $230 \times 8 = 1,840$
   - Total cost for 2 missions: $1,040 + 2 \times 1,840 = 4,720$

7. Participation of an EU expert (G) in density and surface tension reference installations for 2 working days in total (1 mission: 1 return flights):
   - 2 days/per diem
   - Return flights: $130 \times 2 = 260$
   - Per diem: $230 \times 2 = 460$
   - Total cost for 1 mission: $260 + 2 \times 460 = 1,080$

8. All operating costs of 7 experts in Poland (office space, telephone, fax, photocopies, computer, access for information):
   - x

9. "Inventory" phase: collection and analysis of the information
   - x

10. Activity for the project made by experts in their country:
    - expert (B) (20 days):
      - x
      - $200 \times 20 = 4,000$
    - expert (C) (20 days):
      - x
      - $200 \times 20 = 4,000$
    - expert (D) (15 days):
      - x
      - $200 \times 15 = 3,000$
    - expert (E) (5 days):
      - x
      - $200 \times 5 = 1,000$
    - expert (F) (5 days):
      - x
      - $200 \times 5 = 1,000$
    - expert (G) (2 days):
      - x
      - $200 \times 2 = 400$

11. Other costs:
    - x
    - $250$

Total request for Phare financing:
- $68,800$

6. Implementation arrangements

1.1 Beneficiaries: The Central Office of Measures and 2 regional verification offices (OUM) in Gdansk and Poznan

6.2 Contact persons at GUM for the twinning:
- Gas volume in flow measurements
  - Mr Marek Tichy – Director of the Thermodynamic Division, Tel: +48226205437, Fax: +48226543834
- Mass/hardness measurements
  - Ms Ewa Maczewska – Director of the Mass and Force Division, Tel: +48226203192, Fax: +48226208378
- Electrical energy meters
  - Mr Wojciech Stanioch, Tel: +48 22 620 59 70, Fax: +48 22 620 83 78
- Gas mixture measurements
  - Mr Jacek Lipinski – Director of Physical Chemistry Division, Tel: +48226209431, Fax: +48 22 620 83 78