Κώδικας Πρακτικής για την εξωτερική επισκευή μεταλλικών αγωγών διανομής αερίου

(Draft Issue)

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1. Introduction

This document is issued by EDA Attikis detailing the recommendations for those responsible for external joint repairs on ferrous distribution systems for up to 75 mbar.

The objective of the activity is to ensure a safe and adequate supply to the customer when leakages do occur, to deal with them quickly and effectively, as well as preserving the asset.

EDA Attikis has adopted the use of various methods of joint repair techniques, which require the safety precautions detailed in this document. Such methods and materials used require periodic assessment by a competent person to ensure a continuing safe system of work.

Personnel engaged in repair activities must be trained and competent in this field of work.

The maintenance of equipment and protective clothing must be carried out at regular intervals to ensure that these items are fit for purpose.

The revision of Greek legislation and standards is a continuous process and this document must be regarded as a guide to good current practice in Greece, to be read in conjunction with the latest regulations. The current legislation and standards are listed in Appendix 4

These regulations do not attempt to make the use of any method or specification obligatory against the judgement of the responsible engineer. Where new and better techniques are developed and proved, they must be adopted without waiting for modification of this document. Amendments will be issued when necessary.

Requests for interpretation of this document must be addressed to EPA Attikis. If any advice is given on behalf of EDA Attikis, this does not imply acceptance of any liability for the consequences and does not relieve the responsible Engineer of any of his or her obligations.

2. Scope

These specifications are intended to cover the procedures for safe working when carrying out external joint repairs of ferrous distribution systems at pressures up to 75 mbar.

The external leakage repair methods covered in this document are as follows:

a) **Encapsulation**: The encapsulant must be applied to the joint by using mould or mould free systems. The encapsulant usually comprises of a base material and a hardener, which are either injected into a mould or manually applied.

b) **Face seals**: The face seal comprises of an elastomer, which is heated and then compressed onto the face of the joint over a primer.

c) **Mechanical joint repair devices**: These joint repair devices fit over the face of the joint and generally consist of a sealing ring clamped around the joint.

Appendices 1 to 4 form an integral part of this document and cover the following specific areas:

Precautions and first aid treatment

Storage, dealing with spillage and disposal of materials

Maintenance and use of LPG equipment

Current Greek Legislation and Standards.

These specifications must be used with together with other recommendations for repair operations, for example: manufacturers instructions

3. General Safety Precautions

All naked flames and other sources of ignition including static discharge must be avoided in the immediate work area.

Prior to commencing repair work, the flow of gas escaping from the joint must be reduced and maintained to a minimum that is operationally possible to effect the repair. If the leak cannot be contained at an acceptable level, the work must be carried out under direct control of the responsible Engineer, who must take action to ensure that the work is carried out in a safe manner.

Gas levels must be monitored during the work on the gas escape using suitable gas detection equipment.

Fresh air breathing apparatus must be worn if a gas escape situation dictates its use or the confines of the trench are poorly ventilated.

When carrying out an external joint repair on a mechanical joint the gland ring must not be removed.

It must be established, as far as is practicable, visually and by scraping, that the main is not severely corroded and/or graphitised before any form of surface preparation is commenced. During the initial investigation of the main approved eye protection must be worn. There are a variety of methods of surface preparation including, wire brushing, grit blasting, needle gunning and strap cleaning. Where considered appropriate, anti – spark tools must be used. Suitable gloves and approved eye protection must be worn in all cases. Where grit blasting is employed as a cleaning method, reference must be made to relevant safety recommendations**.**

The joint sealing operation must be carried out by a minimum of two competent persons, suitably trained and experienced in such work.

Joint repairs involve the use of a number of different chemicals. General rules which must be followed to ensure their safe handling are as follows:

- Prior to the use of external joint repair materials, the manufacturer's instructions must be read, understood and complied with.

- Conscientious use of protective clothing and materials.

- Careful clean working.

- Good ventilation. Breathing of harmful vapours must be avoided and if necessary breathing apparatus must be worn.

- Solvents must not be used for washing hands or clothing.

- Hands must always be washed after using any joint repair system.

All operatives must be provided with the following minimum protective clothing for use as necessary when undertaking external joint repairs:

a) Protective boots

b) Overalls made from flame retardant anti – static materials.

c) Approved goggles or full-face visor.

d) Suitable gloves, gauntlets and/or protective sleeves.

e) Safety helmet to an approved standard

Protective clothing must be maintained to a high standard and replaced when deterioration dictates.

Consideration must be given to the use of barrier hand creams.

Safety equipment appropriate to normal gas distribution operations including dry powder fire extinguishers, breathing apparatus, first aid kit, including eye wash facilities and a supply of water for hand washing purposes must be available at all times.

Safe means of entry and exit from the excavation must be maintained at all times. For excavations deeper than 1.2 m and/or where ground conditions dictate, adequate trench support must be used.

Precautions to be taken in material storage, dealing with spillage and disposal are shown in Appendix 2

In the event of accidental fire involving joint repair materials, particularly encapsulants, care must be taken to avoid breathing fumes from burning products, as these may be toxic.

Control limits in Greece for substances within this document can be found in the Health and Safety Guidance notes issued by EDA Attikis.

4. Safety Precautions for Encapsulants

4.1 Primers

Certain systems require primers to assist the adhesion of the resin to the pipe.

Primers currently in use may be flammable and/or hazardous to health, being eye and skin irritants and giving off harmful vapours. Precautions and first aid treatment are detailed in Appendix 1. This material must be applied whilst the operative is still wearing appropriate grit blasting protective clothing and has a fresh supply of air.

4.2 Resins and hardeners

In general, mixing two reacting compounds together forms the encapsulation material. Each component may present a hazard and must therefore, be handled with caution.

4.3 Handling of primers, resins and hardeners

Impervious gloves, goggles, approved eye protection and overalls must be worn when handling the primers, resins and hardeners. Latex/rubber type gloves with a permeability (breakthrough time) of at least 20 minutes and a good mechanical strength must be used. In confined spaces, fresh air breathing apparatus must be used.

Containers may become pressurised in stock or in transit and must be opened slowly to avoid accidental discharge of the contents.

When pouring, mixing, or stirring the reactive components, splashing of the contents must be avoided. This is particularly the case when using hydraulic or pneumatically power driven stirrers, which when in motion must not be put into or removed from the components. The stirrer must be stationary when adding hardener to the premixed resin.

All work concerned with primers, resins and hardeners must be carried out in a well, ventilated, area remote from any source of ignition and care must be taken not to inhale the vapour given off.

In all cases it is advisable to read, understand and conform to the manufacturer's instructions and recommendations for use. In addition reference must be made to the appropriate data sheets in the Health and Safety Guidance notes issued by EPA Attikis.

4.4 Moulds

Both disposable and reusable moulds can be used.

Disposable moulds (which may be left in position after encapsulation) may require the use of metal or plastic straps or other types of fasteners. Care must be taken in fitting the moulds and the manufacturers instructions complied with.

Reusable moulds are usually of a more robust construction than disposable moulds and have to be cleaned before re-use. The application of an approved releasing agent to assist the removal of the mould may be an advisable option to use with certain techniques. The release agent may be hazardous to health and precautions and first aid treatment are detailed in Appendix 1

4.5 Injection methods

4.5.1 General

Current methods of filling the mould employ free pouring, pneumatic, or mechanical injection, or a combination of these methods.

Impervious gloves, approved eye protection and overalls must be worn when free pouring or injection is being undertaken since gas escaping from the joint may cause splash back of the encapsulant. Latex/rubber gloves with a breakthrough time of at least 20 minutes and a good mechanical strength must be used.

4.5.2 Pneumatically operated injection equipment

When injection is carried out by means of pneumatic pressure, the hoses, couplings and regulating equipment must be maintained in accordance with good engineering practice. In addition, air receivers must be maintained and inspected in accordance with legislation (see appendix 4).

The injection gun must be tested by the manufacturer to a safe working pressure, equivalent to 1.5 times the maximum attainable pneumatic pressure. Injection guns must have a safe working pressure marked on the body and be fitted with a manually operated valve and vent to permit controlled depressurisation of the equipment after use.

The use of nitrogen cylinders as a pressure source entails the danger of over-pressurising the equipment. However, with a suitable pressure relief system incorporated, it is an acceptable method. Care must be taken when handling inert gas in confined spaces.

4.6 Solvents

4.6.1 General

In the event that manufacturers instructions and good working practices are adhered to, little or no cleaning down of tools, moulds or other equipment should be required.

If it should become necessary to utilise solvents for cleaning purposes, it must be noted that these may be flammable, as indicated on the warning label and may be hazardous to health being eye, skin and respiratory irritants. The safety precautions and first aid treatment are listed in Appendix 1

4.6.2 Handling of solvents

Impervious gloves, approved eye protection and overalls must be worn when handling the solvents. They must be restricted to well-ventilated areas remote from any sources of ignition. Care must be taken not to inhale the solvent vapours, which are heavier than air. However, if there is a risk of inhalation of fumes, fresh air breathing apparatus must be worn.

There is no completely safe cleaning solvent, which is suitable for use with all encapsulation materials. However, the most widely applicable solvent is 1.1.1 trichloroethane, which has the advantage of being non-flammable.

Recommendations regarding the storage, dealing with spillage and disposal of encapsulant materials and solvents are detailed in Appendix 2.

5. Safety Precautions in Appling Face Seals

5.1 Primers

The system requires the use of primers to assist the adhesion of the hot seal to the socket face. Primers currently in use may be flammable and/ or hazardous to health, being eye and skin irritants and giving off harmful vapours. Precautions and first aid treatment are detailed in Appendix 1. This material must be applied whilst the operative is still wearing appropriate grit blasting protective clothing and has a fresh air supply.

5.2 Face seal

The face seal is a rubber compound, which is flammable and care must be taken to avoid direct contact with a naked flame.

5.3 Handling of face seal and primer

All work concerned with the primer and face seal must be carried out in a well-ventilated area remote from any source of ignition and care must be taken not to inhale the vapour given off.

In all cases the manufacturers instructions and recommendations must be read, understood and conformed to. In addition reference must be made to the Health and Safety Guidance notes issued by EDA Attikis.

5.4 Heating of the face seal

Prior to application, the face seal may be heated either in an oven or by immersion in boiling water and appropriate care must be taken when using either method.

The oven or heating source must be positioned securely at a safe distance upwind of the excavation in a gas free area and clear of any location where highly flammable liquids are stored or handled. For the maintenance and use of LPG equipment see Appendix 3.

Suitable gloves, eye protection and overalls must be worn when handling hot face seals.

5.5 Storage, dealing with spillage and disposal

Recommendations regarding the storage, dealing with spillage and the disposal of face seal material are detailed in Appendix 2.

6. Safety Precautions for Mechanical Repair Devices

In all cases the manufacturer's fitting instructions must be read, fully understood and carefully followed.

For surface preparation the main must be carefully cleaned by chipping, scraping or wire brushing. Suitable gloves, approved eye protection, overalls and protective boots must be worn for this operation.

APPENDIX 1: External Joint Repair Systems – Precautions and First Aid Treatment

(See clause1.System	Component	Flammability (See note)	Precautions applicable to all methods (See note)	First aid treatment applicable to all methods
Encapsulant Face seals	Primer	Flammable	These materials may be eye, skin and respiratory irritants therefore approved eye protection suitable protective gloves and overalls must be worn. Avoid breathing vapour especially from activator hardener or primer, which may cause respiratory problems. In confined spaces, additional precautions must be taken e.g. use of breathing apparatus. Do not smoke or eat whilst handling these materials. Do not use naked flames or other sources of ignition. Heat resisting gloves must be worn whilst handling hot materials e.g. face seals	Eyes: irrigate with clean running water for 10 minutes and seek medical attention. Use must be made of wash bottles if immediately available. Inhalation: remove casualty to fresh air immediately and rest. If necessary give artificial respiration, place in recovery position and seek medical attention. Ingestion: give casualty one litre of water to drink and seek immediate medical attention. **Do not make casualty vomit.** Skin: wash contaminated skin thoroughly with soap and water or other cleansing medium. **Do not use solvents to clean the skin.** Where applicable for burns, cool the affected area using cold water for 10 minutes and cover with a sterile dressing and seek medical attention.
	Resin	Non-flammable		
	Hardener	Flammable		
	Release agent	Non-flammable		
	Solvent	Flammable		
	Primer	Highly flammable		
	Seal	Flammable		

APPENDIX 2: Storage, Dealing with Spillage and Disposal of Materials

A2.1 Handling of materials

Impervious gloves, approved eye protection and overalls must be worn when handling materials. Latex/rubber type gloves with a resistance to permeability (breakthrough time) of at least 20 minutes and a good mechanical strength must be used.

A2.2 Storage

All materials must be stored on site in accordance with appropriate legislation (see appendix 4). The materials must be stored in a safe place, away from the trench and secured against interference and being tampered with by unauthorised persons. Storage must be away from naked flames and other sources of ignition in a well ventilate area.

A2.3 Dealing with spillage

All naked flames and sources of ignition must be extinguished. Spillages must be contained and absorbed with sand or earth. Spent absorbent must then be collected into enclosed containers for disposal.

A2.4 Disposal

Disposal of spent absorbent from spillages, used containers, other leakage repair materials and contaminated disposable items must be dealt with in accordance with the manufacturer's instructions and recommendations for use. In addition reference must be made to the Health and Safety Guidance notes issued by EDA Attikis.

It must be noted that the disposal of empty solvent containers and contaminated solvents must be in accordance with the appropriate legislation.

For liquid encapsulation systems the following procedure is recommended:

After the encapsulation of a joint has been completed, any residual amounts of the individual compounds of the encapsulant material must be mixed in the largest container. Before the mixture has set, the smaller container(s), with lids removed, including gloves, must be pushed into the mass. When the mass has set, the lid of the largest container must be replaced and this container returned to the depot for disposal with general rubbish.

Under no circumstances must any of these substances be discharged into drains, emptied onto the ground or burnt.

Stocks of materials that have exceeded their shelf life must be safely disposed of in accordance with the appropriate legislation.

APPENDIX 3: Maintenance and Use of LPG Equipment

LPG cylinders must only be used in the upright position.

All piping, couplings, regulators, LPG cylinders and other auxiliary equipment, e.g. ovens and heaters, must be maintained by a competent person

Only hoses to an approved standard, suitable for LPG can be used. They must be kept short in length and securely fixed with appropriate clips.

Only clips, tapes and compounds approved for use with LPG must be used.

The gases are heavier than air and adequate ventilation is necessary at all times during use.

During transit LPG cylinders must be turned off and properly secured on an open vehicle or in a separate compartment ventilated at floor and roof level.

APPENDIX 4: Current Legislation and Standards

This list of provisions is not exhaustive and may be subject to amendment, in which case the user is advised to make all proper enquiries.

The user is advised to ensure compliance with all other Acts, Instruments, Legislation, provisions and duties in Greek law which prevail

In every case reference must be made to the latest edition

4.1 Statutes and Regulations:

Health and Safety

Control of pollution

Abrasive Wheels Regulation

Construction Regulations

Flammable Liquids Regulations

Protection of Eyes Regulation

Classification and Labelling of Dangerous Substances

Gas Safety Regulations

Street works Act

Traffic Regulations

Grit Blasting Regulations

Control of Substances Dangerous to Health Regulations

Control of Special waste Regulation

Health and Safety Guidance

4.2 Standards

Industrial gloves

Industrial eye protection

Flexible tubing or hose and connections Butane/propane.

Portable liquefied petroleum gas appliances operating at vapourpressure from small LPG containers.

Selection, use and maintenance of respiratory protective equipment.
Industrial safety helmets.

A4.3 Recommendations

Distribution mains

Entry into and work associated with confined spaces.

Use of breathing apparatus and other and other respiratory protective equipment in Transmission and Distribution