

**Requirements for the Use of  
Rework Materials in Manufacturing of  
Polyethylene Gas Pipe  
TN-30/2006**

## FOREWORD

This technical note was developed and published with the technical help and financial support of the members of the PPI (Plastics Pipe Institute, Inc.). The members have shown their interest in quality products by assisting independent standards-making and user organizations in the development of standards, and also by developing reports on an industry-wide basis to help engineers, code officials, specifying groups, and users.

This note has been prepared by PPI as a service of the industry. The information in this note is offered in good faith and believed to be accurate at the time of its preparation, but is offered without any warranty, expressed or implied, including WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Any reference to or testing of a particular proprietary product shall not be construed as an endorsement by PPI, which does not endorse the proprietary products or processes of any manufacturer. Industry members offer the information in this note for consideration in fulfilling their own compliance responsibilities. PPI assumes no responsibility for compliance with applicable laws and regulations.

PPI intends to revise this note from time to time, in response to comments and suggestions from users of the note. Please send suggestions of improvements to the address below. Information on other publications can be obtained by contacting PPI directly or visiting the web site.

The Plastics Pipe Institute  
202-462-9607  
[www.plasticpipe.org](http://www.plasticpipe.org)

January 2006

## TN-30

# Requirements for the use of Rework Materials in Polyethylene Gas Pipe

### Scope and Purpose

This technical note offers guidance and requirements for polyethylene gas pipe manufacturers and provides criteria for evaluation of manufacturers by purchasers of polyethylene gas pipe, with respect to the use of rework of polyethylene materials in the manufacture of ASTM D2513 polyethylene gas pipe. These requirements address the cleanliness of rework polyethylene materials used in the manufacture of ASTM D 2513 polyethylene gas pipe to ensure that the use of rework does not compromise pipe quality. **The user should consult Title 49CFR Part 192 for the current referenced edition of ASTM D2513.**

### Introduction

The requirements in this technical note are designed to ensure the responsible use of rework materials and to ensure compliance with ASTM D 2513. In general, the requirements contained in this document reflect good rework inventory controls, good housekeeping, good manufacturing practices and good record keeping procedures. This technical note addresses only the extrusion process for pipe or tubing from polyethylene materials that are identified in ASTM D 2513, Annex A1. It does not address rework for other piping materials that are identified in ASTM D 2513.

These requirements shall be used to determine if polyethylene gas pipe is produced in facilities that have appropriate procedures for controlling the use of rework materials. A manufacturer shall be evaluated with respect to whether they comply with the rework material requirements of this technical note, ASTM D 2513, product quality, and customer expectations.

### What is Rework?

In meeting ASTM D 2513 requirements, rework, sometimes called regrind, shall have specific characteristics:

- ***Rework shall be clean***

A documentation system shall exist governing the use of rework materials. At a minimum, the documentation system shall include written procedures and instructions for the responsible use of rework in a manufacturer's production process. Rework processes and procedures shall be designed to maintain virgin material cleanliness, avoid introducing contamination, and remove inadvertently

introduced contamination. Contaminated rework materials that cannot be adequately cleaned shall not be used as rework in the manufacture of polyethylene gas pipe.

- ***Rework shall be equal to or better than the material designation of the virgin material***

For polyethylene materials ASTM D 2513 Annex A1 specifies polyethylene materials by material designation as specified by ASTM D 3350. Rework processes and procedures, shall ensure that the source of rework material is from material with the same or higher PPI listed Hydrostatic Design Basis (HDB) at both 73°F and the highest rated temperature, usually 140°F, as the virgin material (e.g. PE4710 can be used in PE4708, but PE4708 cannot be used in PE4710).

- ***Rework shall be generated in the manufacturer's own production***

Rework materials must originate in the manufacturer's own production facilities. A manufacturer may transfer rework among its own facilities provided it is managed in accordance with these requirements and is properly labeled and documented.

Materials from other outside sources are prohibited.

## **Sources of rework**

During the manufacturing process, there are several circumstances that result in the generation of product that is not directly saleable but it is otherwise material that is suitable for use as rework. Examples include:

- ***Startup***
- ***Samples for quality control and quality assurance***
- ***Production changeovers***
- ***Service interruptions***
- ***Unintentional errors and damaged goods***

## **The Rework Process**

The rework procedure shall be designed to assure that contamination is not introduced during the generation of rework material. For example, rework materials must be moved from production, to initial size reduction, to final size reduction to grinding and storage and then to the extruder. In-process rework material may need to be temporarily stored several times during the process. Contamination can be avoided by keeping in-process

rework materials in clean, closed containers, by storage in specially designated areas, and by processing rework material in clean, well maintained equipment.

Good housekeeping and cleanliness in production, rework handling and storage facilities helps maintain the initial cleanliness of rework pipe.

Key elements of the rework process are maintaining correct material identification, preventing contamination, and proper handling and storage. Once the material designation is identified, that identification must be maintained as the rework material moves through the rework process.

### ***Pipe Identification***

According to the requirements of ASTM D 2513, pipe acceptable as rework must be generated in the manufacturer's own pipe and fittings production, so its origin can be traced to records that provide the material designation of the rework pipe.

Rework identification and tracking may take various forms appropriate for the manufacturer's production process. Identification by color alone may not be sufficient and supplemental labeling may be required on the pipe intended for rework.

### ***Pipe Storage***

Pipe to be used as rework shall be stored in a segregated area and clearly marked that the material is intended for use as rework in the manufacture of PE gas pipe. *Non-black polyethylene pipe stored outdoors for over two years from date of manufacture is not suitable for use as a rework.*

### ***Cleaning Pipe Prior to Grinding***

Soiled or otherwise contaminated rework pipe shall be cleaned before processing through the size reduction equipment. Rework pipe that cannot be cleaned is not acceptable as rework material for use in polyethylene gas pipe.

Cleaning must remove dirt, mud, water, stones, chips and shavings and other contamination from the interior and the exterior of each piece of rework pipe. Depending on the type of contamination, cleaning procedures may range from cleaning with clean cloths to washing. Rework materials must be dry before processing through the size reduction equipment.

A written set of procedures and instructions for cleaning of pipe intended for rework are required.

### ***Grinding of Pipe and Fittings for use as Rework***

Initially, rework materials are mostly in the form of pipe. But for use in production, rework pipe must be reduced to chips that can be fed into the extruder. Typically, this is a two-stage process. Depending on the pipe size and configuration, coils or straight lengths of rework pipe must initially be reduced to a size or length that can be fed into various pieces of equipment that reduce rework pipe sections to chips of a manageable size.

Initial size reduction equipment typically includes various types of saws or mechanical splitters that are used to cut coils or pipes into sections, which can be fed into grinding equipment. Final size reduction typically uses grinding equipment where rotating blades chop the pipe sections into chips.

Initial size-reduction equipment such as hand and powered saws will generate chips and shavings. This equipment and the area around the equipment shall be kept clean, both for safety and to prevent contamination. After use, initial size reduction equipment, including handsaws, rotary saws, band saws and chainsaws shall be cleaned, and all chips and shavings discarded as waste. Packaging materials such as plastic and steel strapping, strapping buckles and seals, plastic wrap, pipe end caps, cardboard, and the like must be removed from rework pipe and discarded. Care must be taken to ensure that packaging materials do not enter size reduction equipment.

In the event that grinding and conveying equipment is not specifically dedicated to a unique material (based on the material designation), written procedures and instructions for cleaning of the grinding and conveying equipment are required to assure that cross contamination of dissimilar materials does not occur.

Dust separators shall be used in the material delivery system to reduce any fine particles and/or dust from the rework stream.

### ***Storage of Rework***

In order to prevent entry of foreign materials, ground rework material shall be stored in silos or covered containers dedicated to gas pipe rework use. Gaylord boxes shall be fitted with plastic bag liners. Plastic bag liners shall be deep enough to fold and close over the contents. The liners shall not be reused for dissimilar materials. The rework container shall be clearly labeled with traceability information as determined by the manufacturer.

## **Documentation**

### **Documentation of Rework Procedures**

The manufacturer shall have written procedures for its entire rework process, capable of demonstrating compliance with this document. The manufacturer shall be able to demonstrate that appropriate operators within a facility are trained in the proper procedures and be able to demonstrate compliance.

### **Production Records**

ASTM D 2513 requires maintenance of permanent records that will enable the manufacturer to identify the location of manufacture, pipe production and resin lots, and any additional information which is agreed upon by the manufacturer and purchaser. This documentation shall also include identification of the material designation and maximum percentage of rework, if any, traceable to the print line.

## **Extrusion of Pipe Utilizing Rework**

### **Amount**

For the production of pipe used for natural gas distribution applications, the maximum rework percentage levels shall be no more than 30%.

### **Removing Contamination During Extrusion.**

#### ***Removal of ferrous particles***

Magnets shall be used near the base of the material hopper. The purpose of the magnets is to attract potential ferrous contaminants and remove them from the material stream.

#### ***Filter the melt before it enters the pipe die.***

The extruder shall be equipped with a melt filtering system capable of filtering out particles of a nominal size equal to or greater than 10% of the minimum wall thickness of the pipe. In no case shall the melt filtering system be designed to allow particles larger than 0.017 inches.