CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Previously, the effect of external defects was studied via a series of small-scale experiments and through a nonlinear numerical model based on the finite element method. After calibration was conducted, based on the experimental results, the model was used to determine the burst pressure as a function of material and geometric parameters of different pipes and defects. In this case, Polyvinyl chloride pipelines will be the model and specifically it will involve only Polyvinyl chloride fittings which are the long radius 90 degree elbow and tee. The effect of the defect that introduced to the fitting will be viewed on their burst pressure. Burst pressure is the maximum pressure which the Polyvinyl chloride fitting can endure before it will break.

Malaysian standard (MS) is a standard that developed in Malaysia. The Department of Standards Malaysia (DSM) is the national standardisation and accreditation body. Malaysian Standards are developed through consensus by committees which comprise of balanced representation of producers, users, consumers and others with relevant interests, as may be appropriate to the subject in hand. These standards where appropriate are adoption of international standards. Approval of a standard as a Malaysian Standard is governed by the Standards of Malaysia Act 1996 (Act 549). MS628 is the Malaysian standard for Polyvinyl
chloride joints and fittings. ASTM International is the American Society for Testing and Materials (ASTM) are an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. The ASTM standard for joints and fittings that is parallel to MS628 is ASTM D2665. British Standards are the standards produced by BSI Group which is incorporated under a Royal Charter. The BSI Group produces British Standards under the authority of the Charter. The British standard for Polyvinyl chloride joints and fittings is BS4346.

1.2 IMPORTANCE OF RESEARCH

The consequences of a reduced operating pressure can be viewed economically such as loss of production due to downtime, repairs, or replacement which are can be severe and, in some cases, not affordable. Thus, there are several pipelines kept in operation even though signs of erosion are visible on their external surface. This only can be done if the burst pressures of the defected pipelines are known. Detail understanding on the effects that caused by the defects on the burst pressure will allow for the management of allowable defects on pipelines. The knowledge able us to define at which level the defect should be fixed or action need to be made on the pipelines, specifically to the fitting.

1.3 PROBLEM STATEMENT

In testing pipelines specifically the fittings, the connection must be perfectly strong enough to ensure that the burst of the fittings are only due to the defect introduced, not by any weakness or leakage in connection. In addition, leakage in connection will cause pressure leakage. Another problem involved is to get the best method to introduce the defect on fitting which will give the same criteria when a fitting has undergone thermoplastic failures such as erosion and cracking.
1.4 OBJECTIVES

The project is concentrate on:

1. To observe and analyse the effect of defected Polyvinyl chloride fittings on their collapse or burst pressure.
2. To compare the experimental data with theoretical data of collapse pressure.

1.5 SCOPES OF STUDY

The scope of study is to carry out experimentation procedures and analysis of burst pressure test on Polyvinyl chloride fittings. Burst pressure test is important for quality maintenance and prediction of remaining strength of a Polyvinyl chloride fitting.

1.5.1 Standard of Short Term Hydrostatic Burst Test

The test will be carried out based on the Malaysian standard of MS628. The apparatus specification of this standard is the apparatus shall consists of a temperature controlled water bath or air space maintained at 20 °C ± 1 °C and equipment that permits the joint or fitting to be subjected to an internal hydrostatic pressure to an accuracy of ± 2 %. The standard also requires The specimen shall be a complete joint or fitting. The open ends of the specimen shall be closed with suitable end caps, and these shall be provided with connections for the entry of water under controlled pressure. Joints and fittings not designed to withstand the end thrust due to internal pressure may have their open ends closed with male plugs which are retained in place by a jig or former. Joints and fittings designed to withstand the end thrust due to internal pressure. The method of closure of the open ends and the mounting of these joints and fittings in the apparatus shall be arranged so that the full end thrust is carried by the test specimen.