ASME STANDARDS TECHNOLOGY, LLC

STP-PT-091

AUTOMATED EXTERNAL PRESSURE CHART GENERATION

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Date of Issuance: June 4, 2021

This publication was prepared by ASME Standards Technology, LLC ("ASME ST-LLC") and sponsored by The American Society of Mechanical Engineers ("ASME").

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Two Park Avenue, New York, NY 10016-5990

ISBN No. 978-0-7918-7456-1

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FOREWORD

Acknowledgements

The authors gratefully acknowledge the ASME Peer Review Group members for their thoughtful review and guidance of this project. The ASME Peer Review Group members, in alphabetical order, are John Grubb, Wolfgang Hoffelner, Jim McMaster, and Bob Mikitka.

The authors also gratefully acknowledge the ASME Project Engineer Steve Rossi and ASME ST-LLC Project Manager Selin Sahici for their help with organizing this project.

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EXECUTIVE SUMMARY

This report describes the development of a computer program for generating normalized stress-strain curves from raw data and development of a computer program for generating external pressure chart from normalized stress-strain curves.

Part 1 of this research program is to develop a software program for plotting stress-strain diagrams for a given material from data furnished by users. The stress-strain diagram is then normalized based on the yield stress and modulus of elasticity published in the ASME Boiler and Pressure Vessel Code, Section II, Part D. The stress-strain curve is then used to develop an external pressure curve.

The software program for this project is Excel Visual Basic for Applications. The input sheet permits the user to enter furnished stress-strain data as well as published modulus of elasticity and yield stress. The program then generates a normalized stress-strain curve.

Part 2 of this research program was to develop a software program for plotting External Pressure Charts (EPC) from normalized stress-strain curves obtained from Part 1 for ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 applications. The External Pressure Charts are based on the yield stress and modulus of elasticity published in the ASME Boiler and Pressure Vessel Code, Section II, Part D.

The software program for this part of the project is Excel Visual Basic for Applications. The input sheet permits the user to enter furnished stress-strain data as well as published modulus of elasticity and yield stress. The program then generates an External Pressure Chart.

ABBREVIATIONS AND ACRONYMS

B	$S_c/2$
E	Modulus of Elasticity
EPC	External Pressure Chart
E_t	Tangent Modulus
ε	Strain
P_L	Proportional Limit in a Stress - Strain Diagram
r	Pearson Correlation Coefficient
S_c	Compressive Buckling Stress
S_y	Yield Stress
σ	Stress
σ_e	Standard Deviation of a Set of Strain Data
σ_s	Standard Deviation of a Set of Stress Data
VBA	Excel Visual Basic for Applications

1 INTRODUCTION

As Part 1 of this research program, a computer program using Excel Visual Basic for Applications was developed and an input sheet is provided for inputting stress-strain raw data. The program then generates a normalized stress-strain curve to be used by ASME for producing external pressure chart for the material.

As Part 2 of this research program, a computer program using Excel Visual Basic for Applications was developed and an input sheet is provided for inputting stress-strain raw data. The program then generates a normalized stress-strain curve and an EPC for the material.