



دبلوم تطبيقات التحكم الأوتوماتيكي في نظم القوى الميكانيكية

MEP 578 Industrial Valves: Types, Selection and Construction

Dr. Mohsen Soliman, ACC Manager
Mechanical Power Engineering Department

مك 578 تطبيقات التحكم بالمحابس الصناعية: الأنواع-التصميم-التركيب والإنشاء-الصيانة:

يتضمن المقرر مقدمة عامة حول أساسيات ووظائف وطرق إختيار أنواع المحابس الصناعية المختلفة، الإعتبارات الهيدروليكية، التركيب والأجزاء ، تصنيف وتقييم المحابس، مواد تصنيع أجزاء المحابس، المواصفات العلمية لإختيار وتصميم وتوصيف ومعايرة المحابس. سريان الموائع المختلفة في المحابس، حسابات وخرائط ومعادلات الفاقد في الضغط لكافة الأنواع المختلفة، عوامل إختيارات أحجام ومقاسات المحابس، العزل والتسريب من المحابس، التكهف والسريان ثنائي الطور داخل المحابس .
المحابس اليدوية: الأنواع، الإختيار، التشغيل، التوصيلات .

المحابس الأوتوماتيكية لنظم التحكم المختلفة: محابس التحكم في الضغط ومحابس الأمان في خزانات ونظم السوائل والغازات، محابس التحكم بالوسائل الكهربائية. مشاكل تصميم وتركيب وتشغيل وصيانة المحابس، ظاهرة المطرقة المائية وعلاقتها بالمحابس. الأنواع الخاصة من محابس التحكم الأوتوماتيكي في الدوائر الهيدروليكية والدوائر النيوماتية.

What do we have in the Industrial Valves Course?

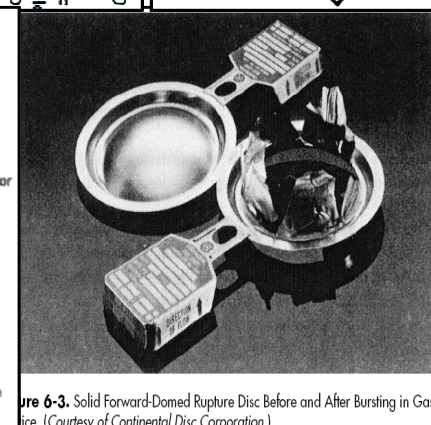
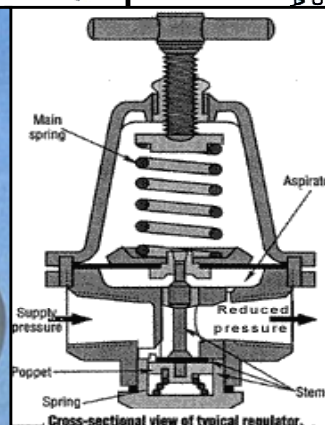
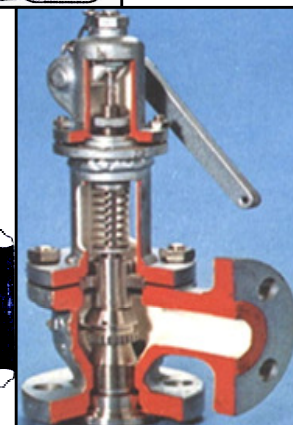
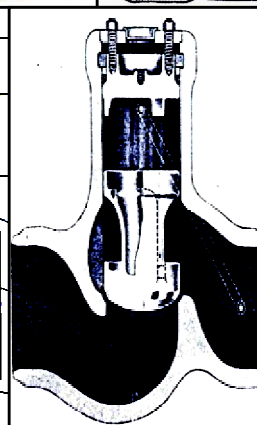
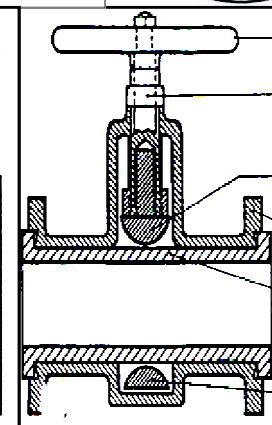
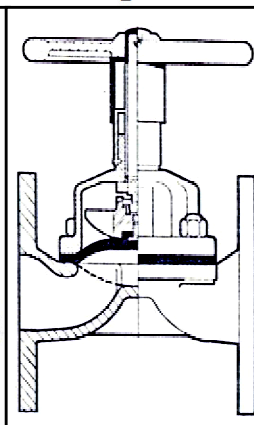
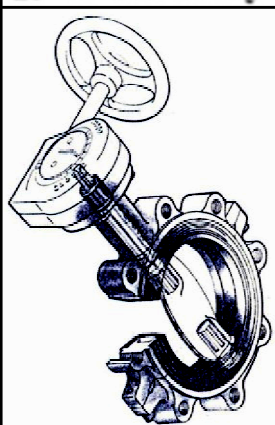
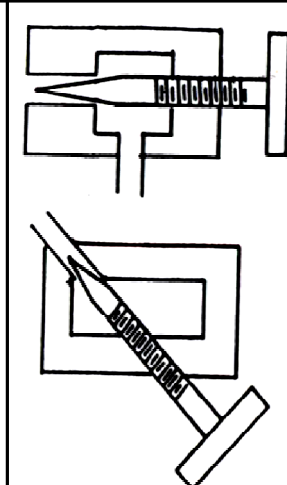
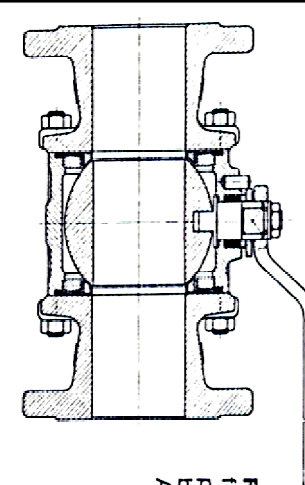
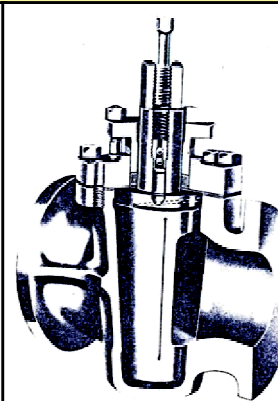
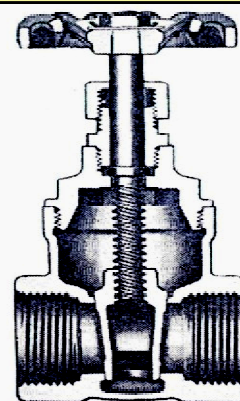
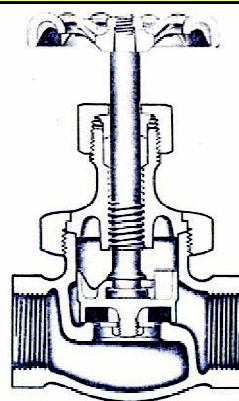
MEP 578 - Applications of Industrial Valves: Types, Design, Construction, Installing, and Maintenance

Course Program and Contents: Introduction+ movie (all types of valves, basic functions, selection)- Fundamentals (hydraulic considerations, construction, Classes or ratings, materials, standards for valves, standards for different parts)- Fluid Flow in valves (calculation of pressure losses, design & sizing parameters, cavitations, fluid-tightness, solved example on sizing) - Operation of Manual Valves (types, selection, connections, operation) -Non-manual Valves: Check Valves (types, selection, design and installation factors, examples) + a movie- Control Valves: Pressure Relief Valves (direct acting, characteristics) –_Automatic & Electric Valves (spool types, single/multi-stage controls)- Problems of Valves & valve Maintenance (some movies)- Water Hammer -Special Types of valves (in Hydraulic or Pneumatics Circuits).

Fundamentals: Common Types of Valves (manual or automatic)

Given a drawing of a valve, IDENTIFY each of the following types of valves:

- | | |
|--------------|------------------|
| a. Globe | g. Diaphragm |
| b. Gate | h. Pinch |
| c. Plug | i. Check |
| d. Ball | j. Safety/relief |
| e. Needle | k. Reducing |
| f. Butterfly | L. Rupture Disk |



Automatic Valves

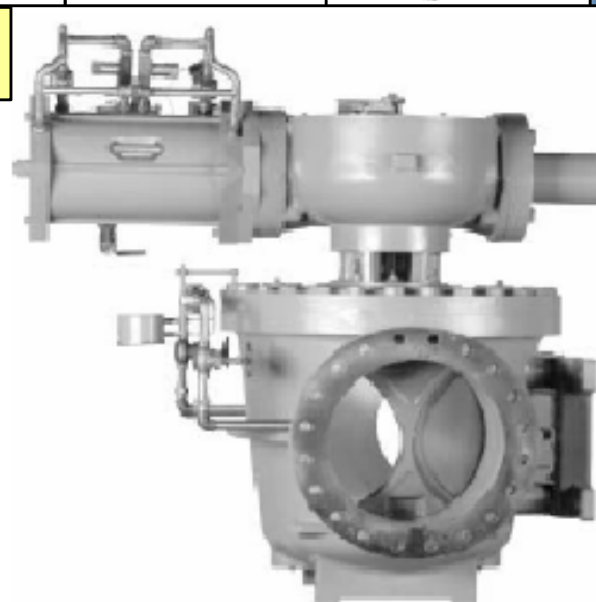
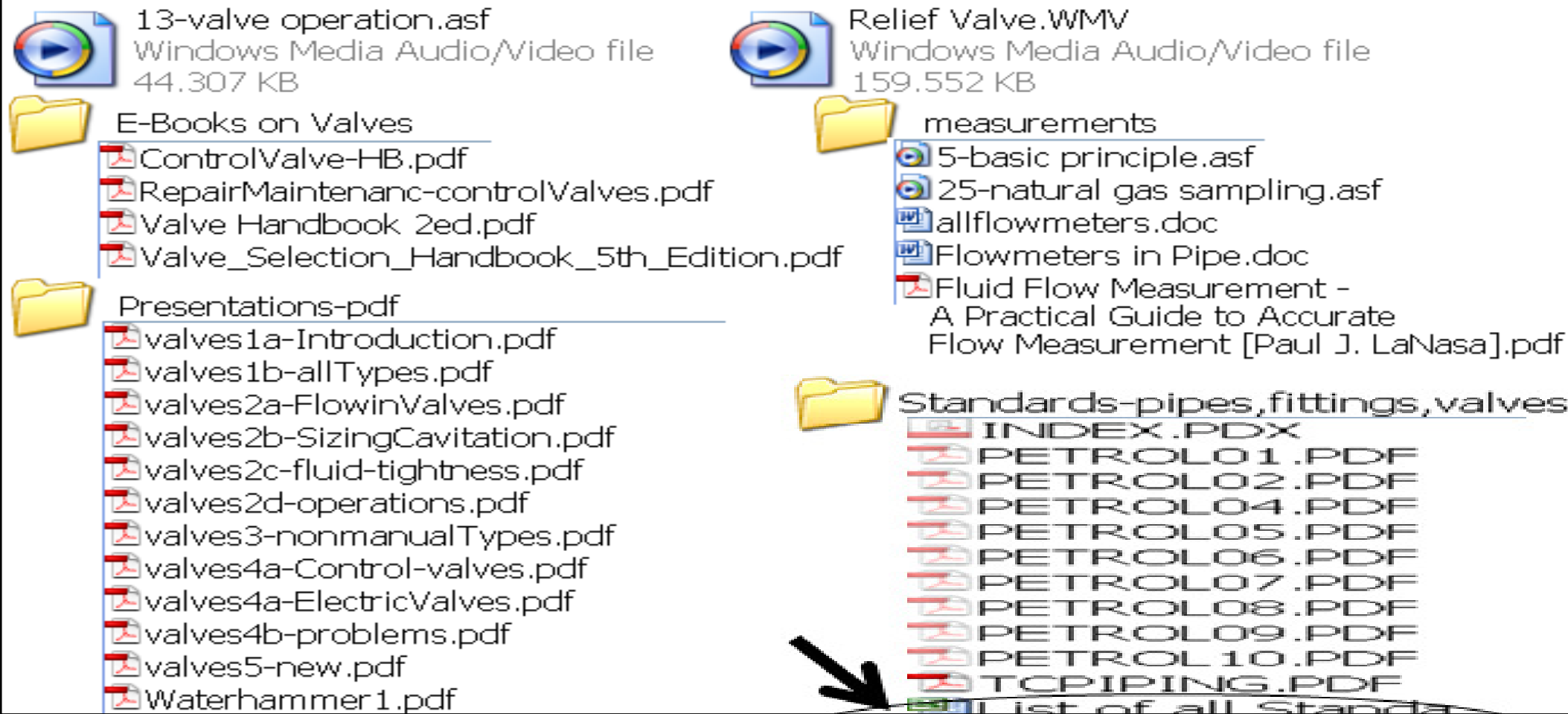


Fig: 5.4 Roto valve

Figure 6-3. Solid Forward-Domed Rupture Disc Before and After Bursting in Gas Service. (Courtesy of Continental Disc Corporation.)

- 1- **Introduction+ movie** (all types of valves, basic functions, selection).
- 2- **Fundamentals** (hydraulic considerations, construction, Classes or ratings, materials, standards for valves, standards for different parts).
- 3- **Fluid Flow in valves** (calculation of pressure losses, design & sizing parameters, cavitations, fluid-tightness, solved example on sizing)
- 4- **Operation of Manual Valves** (types, selection, connections, operation)
- 5- **Non-manual Valves: Check Valves** (types, selection, design and installation factors, examples) + a movie
- 6- **Control Valves: Pressure Relief Valves** (direct acting, characteristics)
- 7- **Automatic&Electric Valves** (spool types, single/multi-stage controls)
- 8- **Problems of Valves & valve Maintenance** (some movies)
- 9- **Water Hammer**
- 10- **Special Types of valves (in Hydraulic or Penumatics Circuits)**

Also related to [Course Program and Contents](#): What do we have on the CD ?



Course Specifications & Basic Information

1. Title:	Applications of Industrial Valves: Types, Design, Construction, Installation, and Maintenance	Code:MEP578
2. Credit hrs per week	Lectures= 3 hours per week	Tutorial= 0.0
	Practical= 0.0	Total=3 Cr.Hrs

B- Professional Information

1. Course description: Overall Aims:

This an elective Course which includes the following contents: Introduction-(all types of valves, basic functions, selection)- Fundamentals (hydraulic considerations, construction, Classes or ratings, materials, standards for valves, standards for different parts)- Fluid Flow in valves (calculation of pressure losses, design & sizing parameters, cavitations, fluid-tightness, solved example on sizing) - Operation of Manual Valves (types, selection, connections, operation) -Non-manual Valves: Check Valves (types, selection, design and installation factors, examples) + a movie- Control Valves: Pressure Relief Valves (direct acting, characteristics) – Automatic & Electric Valves (spool types, single/multi-stage controls)- Problems of Valves & valve Maintenance (some movies)- Water Hammer -Special Types of valves (in Hydraulic or Pneumatics Circuits).

2. Intended Learning Outcomes of Course (ILOs):

a) Knowledge and Understanding:

Having successfully completed this course, the post-graduate student should have the knowledge and understanding of:

- Fundamentals of Valves : hydraulic considerations, construction, Classes or ratings, materials, standards for valves, standards for different parts.
- Fluid Flow in valves: Types of pressure losses, design and sizing parameters, cavitations, and fluid-tightness.
- Operation of Manual Valves :types, selection, connections, operation.
- Non-manual Valves: Check Valves: types, selection, design and installation factors.
- Safety Control Valves: Pressure Relief Valves: direct acting, characteristics.
- Automatic actuated Valves and Electric Control Valves: spool types, single/multi-stage controls.
- Problems of Valves and valve Maintenance
- Water Hammer
- Special Types of valves: (in Hydraulic or Pneumatics Circuits.

b) Intellectual Skills:

Having successfully completed this course, the student should have the ability to do:

- Analysis of different hydraulic considerations for valves selection, construction, and specifying Classes or ratings, materials, standards for valves, standards for different parts.
- Calculations of Fluid Flow in valves including Types of pressure losses, design and sizing parameters, cavitations, and fluid-tightness.
- Analysis of various methods for Operation of Manual Valves :types, selection, connections, operation.
- Analysis of types of Non-manual Valves: Check Valves: types, selection, design and installation factors.
- Analysis of various types of Safety Control Valves: Pressure Relief Valves: direct acting, characteristics
- Investigation of types of Auto. actuated Valves & Electric Control Valves: spool types, single/multi-stage controls.
- Analysis of different Problems of Valves and of valve Maintenance
- Analysis and investigation of Water Hammer problems associated with valves operation and type.
- Studying Special Types of valves: (in Hydraulic or Pneumatics Circuits.

c) Professional and Practical Skills:

Having successfully completed this course, the student should have the ability to do:

- Specifying Classes or ratings, materials, standards for valves, and standards for different parts.
- Find all types of pressure losses in valves, design and sizing parameters, cavitations, &fluid-tightness.
- Deal with various methods for Operation of Manual Valves or non-Manual valves.
 - Deal with various types of Safety Control Valves: Pressure Relief Valves: direct acting, characteristics
- Use types of Auto. actuated Valves & Electric Control Valves: spool types, single/multi-stage controls.
- Solve different Problems of Valves and of valve Maintenance
- Deal with Analysis and investigation of Water Hammer problems associated with valves operation and type.
- Use Special Types of valves: (in Hydraulic or Pneumatics Circuits.

d) General and Transferable Skills:

Having successfully completed this course, the student should have the ability to do:

- Perform engineering calculations, draw feed-back control circuits, block diagrams, graphical presentation of experimental data, and perform data-regression analysis.
- Transfer knowledge, Work in group, & Communicate in written & oral forms, in English.
- Use IT& evolutionary technological tools& PC applications (Excel, Mat lab, Virtual labs, .etc).
- Prepare & write reports, Manipulate & sort data, Think logically, and continuous self-E-learning.
- Identify practical problems, compare between different technologies for measurement systems.
- Organise & manage time & resources effectively; for short-term and longer-term commitments.