Grooved Pipe Systems
Couplings For Grooved End Pipe

• Established 1919
• Years of success in multiple markets
  – HVAC
  – Fire Protection
  – Industrial
  – Mining
  – Municipal
  – Oil
Early presentation – circa 1925
WWII – Rhone River pipeline

487 miles long, conveying fuel

Consisted of one 4” and two 6” pipes
The Concept
Anatomy of a Grooved Joint

- **Features 4 major components:**
  - Groove
  - Elastomer Gasket
  - Coupling Housing
  - Track Bolts & Nuts
Roll vs. Cut Grooves

- Roll grooving is the preferred method for all water and air services.
- Cut grooving is for specific applications such as abrasion resistance, special pipe linings and where additional joint movement is required.
- Both Roll & Cut grooved joints have the same pressure and end load ratings.
Roll Grooves

- Grooves are formed primarily by roll grooving (or cold forming) a groove into the pipe.
Roll Grooves

• **Materials**
  - Carbon Steel (Galvanised)
  - Stainless Steel
  - Copper
  - PVC

• **Sizes**
  - 3/4” through 48”

• **Wall Thickness**
  - Schedule 5 through 40
Roll Grooves

- Roll Grooving Tools
  - Field and Shop Models
  - Provide field fabrication advantages
  - Electric Power and hand-tools
  - Fabrication Shop tooling
Cut Grooves

• Cut grooving removes material from the pipe wall to machine a groove in the pipe.
Elastomer Gasket

- **Elastomer Gaskets**
  - Synthetic engineered elastomers
  - Proprietary formulations (EPDM)
  - Reusable, yet permanent seal
  - Maintains seal during joint movement and deflection
  - Material selection critical
Elastomer Gasket

• **Gasket Design**
  – Standard “C” Section

• **Triple Seal**
  – Initial Stretch and Pre-loading
  – Housing Compression
  – Pressure or Vacuum
Housing

- Standard housing is of ductile iron to ASTM A-536 Grade 65-45-12
- Encapsulates gasket & locks in grooves uniformly around full circumference to create a self-restrained pipe joint
- Housing design dictates performance characteristics (pressure, rigid/flexible...etc)
Bolts & Nuts

- High-strength carbon steel to ASTM A-183 minimum tensile strength
- Zinc electroplated, galvanized or stainless steel (applications)
- Track-head design advantages
Applications

• Building Services
  – LTHW
  – CHW
  – Plantroom piping
  – Wet and dry risers
  – Sprinkler systems
  – Domestic hot & cold water
  – Potable water
  – Cooling tower piping
  – Condensor water
  – Storm and roof drains
“Critical” Applications

- Life Safety Sprinkler Systems
- Hydraulic elevators
- Wimbledon Centre Court
- Casinos
APPROVED WORLDWIDE

BBA
WRAS, DVGW, NSF
ASHRAE
ANSI / AWWA
LPC, VDS
UL / FM
NFPA
FDA
ASTM
ASME
API....
Why Grooved Products?

- Proven, reliable system
- Cost-effective joining method
- Meets stringent design requirements
- No naked flames/hot work permits
- Union at every joint
- Easier to install and maintain
- Meets industry standards
- Saves time and money
- Over 80 years of service history
Assembly Times Comparison

- Flange
- Weld
- Grooved
The Grooved System

- Couplings rated to 4000 PSI/275 bar with 3 to 1 safety factor*
- Gasket temperature range from -40 to +177ºC*
- Sizes from 3/4” to 42”/20mm to 1050mm dia. for direct grooved pipe

*dependent on coupling/gasket selection
Grooved Piping Products
Coupling Types

**Flexible**
A Flat pad housing design allows for a flexible joint

**Rigid**
An Angled pad housing design allows for a rigid joint
Grooved System Benefits

• Create rigid and/or flexible piping systems
• Reduces noise/vibration without special components
• Allows for angular and linear movement
• Expansion/contraction capabilities
• Eliminate flex connectors
Weld to Grooved System

- Typical welded pipe run design
- Anchor points and guides are required
Weld to Grooved System

- Same pipe run as grooved system
- Anchors, guides and hanger spacing remain the same
- All rigid couplings utilised except where thermal movement is to be accommodated
- Grooved system provides two distinct advantages
Weld to Grooved System

- Space savings by eliminating expansion loop
- Use inline expansion joint
- Anchors, guides and hanger spacing remain the same
- Lets go one step further
Weld to Grooved System

- Optimal system design
- One anchor, two guides and an expansion device are eliminated
- Best in terms of value engineering
Noise and Vibration Attenuation
Flexible Coupling Solution

• 3 flexible couplings provide superior vibration and noise attenuation to traditional flexible hose or arch type connectors
  – Rubber Gasket acts to dampen
  – Coupling key section “floats” within the groove
  – Pipe Ends are separated
Vibration Attenuation

- **Flexible Grooved Coupling Advantages**
  - Permanent connection.
  - No additional components / cost added to the system.
  - Anchors / Tie rods not required.
  - Easy to insulate.
  - No annual maintenance.
  - Fatigue advantage.
  - Perception of vibration isolator being “universal flex connector.”
Nu Tech Testing

- Independent Testing
  - Testing by an independent lab showed three flexible couplings in close proximity to sources of vibration will provide superior attenuation characteristics to flexible metal hose type and elastomeric arch type devices.
Flexible Coupling Solution

• Use of additional couplings of flexible or rigid design will further reduce the transmission of vibration
Seismic Stress and Movement Accommodation
GLOBAL SEISMIC HAZARD MAP

Produced by the Global Seismic Hazard Assessment Program (GSHAP), a demonstration project of the UN International Decade of Natural Disaster Reduction, conducted by the International Lithosphere Program. Global map assembled by D. Steck, G. Grünthal, K. Sandvol, and P. Zoback 1995.
Victaulic Seismic Swing Joints
Grooved Coupling Benefits

- Installed with “off the shelf” standard components (grooved fittings & flexible couplings)
- Less expensive material
- Easier to install
- No maintenance required
- Handles movement in all directions
Seismic Performance
Grooved System Benefits

- Offer owners a better, faster piping method
- Complete piping system
- On-site assistance
- Meet stringent project deadlines
- Easier installation and maintenance
- Excellent for hybrid systems
- Best system for today’s labour force
Open Discussion