GENERAL PROCEDURE FOR APPLYING RUBBER LINING TO PIPE

1. METAL SPECIFICATION

Pipe should be fabricated in accordance with requirements found in RMA Bulletin IP-4-2 (see Appendix I for reference information).

2. METAL PREPARATION

All metal surfaces to be lined should be blasted to a gray-white metallic color. The surface should be free of all oil, grease, dirt, mill scale, rust or other foreign matter.

3. CEMENTING

Apply cement primer immediately after blasting. Apply additional coats of cements as specified in technical data sheets. Cements are normally applied on inside of pipe with a swab. Allow sufficient drying time between cement coats as per Section 8.

4. LINING PROCEDURE FOR STANDARD FLANGED PIPE

a) Form a tube with lining stock using longitudinal skived butt seams. To facilitate stitching of the skived seam, a metal strip of aluminum 1” wide and 25 ft. long is used inside the tube while it is being formed. The spliced tube’s outside circumference should be slightly less than the inside circumference of the pipe. The following chart is a suggested guideline for cutting width of tubes for schedule 40 pipe.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>1/8” &amp; 3/16” Lining</th>
<th>1/4” Lining</th>
<th>Splice Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2”</td>
<td>4-1/4”</td>
<td>4”</td>
<td>1/2”</td>
</tr>
<tr>
<td>2”</td>
<td>5-3/4”</td>
<td>5-1/2”</td>
<td>1/2”</td>
</tr>
<tr>
<td>2-1/2”</td>
<td>7”</td>
<td>6-3/4”</td>
<td>1/2”</td>
</tr>
<tr>
<td>3”</td>
<td>8-3/4”</td>
<td>8-1/2”</td>
<td>1/2”</td>
</tr>
<tr>
<td>4”</td>
<td>12”</td>
<td>11-3/4”</td>
<td>1”</td>
</tr>
<tr>
<td>5”</td>
<td>15”</td>
<td>14-3/4”</td>
<td>1-1/2”</td>
</tr>
<tr>
<td>6”</td>
<td>18”</td>
<td>17-3/4”</td>
<td>1-1/2”</td>
</tr>
<tr>
<td>8”</td>
<td>24”</td>
<td>23-3/4”</td>
<td>1-1/2”</td>
</tr>
</tbody>
</table>
For pipe over 12", measure inside circumference of pipe and cut overall width to fit the diameter.

Pipe larger than 16" can be lined with two pieces of stock and joined with laps. Pipe that has a diameter large enough for personnel to enter should be lined in the same manner as tanks or ductwork.

b) Apply twisted multifilament string lengthwise in pipe to permit proper air venting between pipe and lining. Do not use string made from synthetic yarns. Stringing should be done after cementing and the individual strings should be spaced equally around the inside circumference. Normally, four strings are used on pipe with diameters up to and including six inches. Larger size pipe normally uses additional strings.

c) Enclose the tube in a liner and attach a towrope. Pull tube into pipe with a slow constant pull.

d) Remove liner and expand tube against pipe wall by using air pressure. A mechanical extension and flange arrangement may be used for the pipe ends so that a minimum of 10 psig internal pressure can be maintained in the expanded tube for at least five minutes (see pipe lining pictures).

e) Remove extension and flare excess stock over flange face and trim flush.

f) Apply a covering to full face of flange. Skive ID of flange stock to slightly less than ID of lining and stitch firmly to tube stock. When using hard rubber lining on flanges, it is important that customer understands that soft rubber gaskets are required over the face lining.

g) On pipe sizes larger than 6", the flange stock may be lapped onto the lining instead of the skive used on smaller size. This lapping technique makes a stronger joint and is the preferred method. Some customers may prefer not to have laps at flanges because of abrasion considerations or requirements on full line capacity. (See various flange covering sketches for alternate procedures, Sketches 1301 and 1302.)

h) See sketches 1304 and 1305 for suggested lining styles of lateral nozzles and side outlets.

5. LINING PROCEDURE FOR VICTAULIC PIPE

a) Line inside of pipe in accordance with procedures used for standard flanged pipe.
b) When using 1/8” through 1/4” linings the tube lining should be extended over the end of the pipe and bent back into the recess on the outside of the pipe. Apply a round of friction tape over the OD of outside rubber. After cure remove tape and buff OD flush with OD of metal (see sketch 1303).

6. GUIDELINES FOR NUMBER OF LAPS IN PIPE AND FITTINGS

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>No. of Horizontal Laps</th>
<th>No. of Circumferential Laps</th>
</tr>
</thead>
<tbody>
<tr>
<td>3” thru 6”</td>
<td>1</td>
<td>“2 in 20’ sections</td>
</tr>
<tr>
<td>8” thru 16”</td>
<td>2 (180° apart)</td>
<td>0 in 8’ and under sections</td>
</tr>
</tbody>
</table>

*Minimum length of tube 4’ to 5’
FLANGE COVERING METHODS
SKETCH 1301

Tube Stock Skived To Flange Stock

Rubber Lining

Tube Stock Rolled Out On Flange Face

Rubber Lining

Rubber Lining To Maintain Thickness Over The Flange Face
FLANGE COVERING METHODS
SKETCH 1302

Flange Stock Skived To Tube Stock

Flange Stock Lapped On To Tube Stock

Rubber Lining
The Cross Section Illustrates The Manner In Which The Rubber Lining Is Lapped Completely Over The Pipe Ends. The Victaulic Gasket Seats On The Lapped Over Lining And Makes A Completely Projected Seal.
PIECE LINING PROCEDURE

1. Making Up Tube
2. Making Up Tube
3. Making Up Tube
4. Swabbing Tube
9. Pulling Tube Through Pipe

10. Removing Cloth Liner

11. Breaking Tube Back Over Flange Cap
12. Rubber Lined Pipe With Flange Cap Assembly
   Inflated With Air Pressure

13. Rubber Tube Extending From
    Pipe After Extension Flange
    Has Been Removed

14. Flaring Tube Stock Over Face Of Flange
15. Trimming Tube Stock Flush With Flange Face
16. Trimmed And Finished Tube Stock Before Application Of Flange Covering
17. Cutting Out Flange Stock
18. Cutting Out Flange Stock
19. Swabbing Flange Covering With Solvent

20. Swabbing Flared And Trimmed Tube Stock Before Applying Flange Covering

21. Applying Stock To Flange Face

22. Stitching Down Flange Stock
23. Cutting Rubber Out Of Bolt Holes

24. Finished Pipe Ready For Cure