

**"THERMA" tapes ("Therma-40", "Therma-60")**

TU 2245-024-44271562-2007

(replaces TU 2245-002-44271562-00)

(two-layer insulation for pipelines as per GOST R 51164-98)



"Therma" tape is the two-layer insulating material that is comprised of the heat & light-stabilized radiation modified (cross-linked) polyolefin base tape with applied hot melt adhesion layer.

"Therma" tape is used to insulate the linear pipeline portions, individual steel pipes, branches and shaped objects of various diameters and applications. Operating temperature ranges: from - 40° C to + 40° C for "Therma-40" tape; from - 40° C to + 60° C for "Therma-60" tape.

The tape can be used both as anticorrosion insulation when applied directly onto the steel surface of pipelines, and for waterproofing (flashing) when applied as covering layer above the heat-insulating layer (on the base of mineral wool, polyurethane foam, etc.).

The tape will be installed by means of lap-winding process both in the base at the fixed equipment, and in the route conditions if honoring the application technique.

When applied on the insulated surface, the tape creates two-layer insulation in one run.

**Parameters of produced tape "THERMA-ST"**

"THERMA" tape is manufactured in accordance with TU 2245-024-44271562-2007, and supplied in rolls with weight of 40±5 kg. Different widths, thicknesses and weights of rolls can be requested by the Client.

Width	Thickness	Roll tape length	Roll diameter
100±2 mm	1.4+0.2 mm	70 st. m.	30±5 cm
150±2 mm	1.8+0.2 mm	50 st. m.	
225±2 mm	2.0 + 0.2 mm	30 st. m.	
350±2 mm	2.4 + 0.2 mm	24 st. m.	
450±2 mm			
650±2 mm			

**Parameters "THERMA" tape**

We recommend selecting the "Therma" tape of optimum thickness and width based on the outside pipe diameter. Different widths, thicknesses and weights of rolls can be requested by the Client

Pipe diameter	Thickness of "Therma" tape		Width of "Therma" tape	
	nominal	limit deviation	nominal, mm	limit deviation
up to 273 mm	1.4 mm	+0.2 mm	100, 150	±2.0 mm
up to 530 mm	1.8 mm		150, 225	
up to 720 mm	2.0 mm		225, 300	
up to 1020 mm	2.4 mm		300, 350	
over 1020 mm	2.4 mm		350, 450	

Example of legend required to order the "Therma" type tape with nominal thickness of 1.8 mm and nominal width of 450 mm:

**"THERMA" tape 450 x 1.8;  
TU 2245-024-44271562-2007;  
12 rolls**


Application details can be found in the second part of this catalogue.

The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under "Instructions for use".

Under the Section "Useful calculations" you may use our on-line calculator "Consumption of tapes for the lap winding", which will allow you using the tapes with optimum thicknesses and widths? It will immediately calculate the amount of tape (in standard meters and kilograms) that is needed to insulate the pipe with specified length and diameter.

Produced Materials  
Basic Characteristics of “Therma” tape

TU 2245-024-44271562-2007  
(replaces TU 2245-002-44271562-00)

Indicator	Normative as per TU 2245-024-44271562-2007		<p>Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU)</p> <p>Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means</p> <p>Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance. Maximum guaranteed shelf life before the usage commencement cannot exceed one year.</p>
	Tape "Therma 40"	Tape “Therma 60”	
Appearance	Tape shall not have any wrinkles, breaks, holes or gaps		
Tensile strength of the base film	At least 15 MPa	At least 15 MPa	
Elongation at failure	at least 200%	at least 200%	
Longitudinal shrinkage	10 - 25	10 - 25	
Gel fraction content in the base film	40 - 80 %	40 - 80%	
Adhesion to steel, under 20±2° C: - for pipe sizes from 1220 mm and more - for pipe sizes from 820 to 1020 mm - for pipe sizes up to 820 mm	at least 7.0 kN/m at least 5.0 kN/m at least 3.5 kN/m	at least 7.0 kN/m at least 5.0 kN/m at least 3.5 kN/m	
Adhesion to steel, kN/m minimum after 1000 hours of testing in water under the following temperatures: • 20° C • 40° C • 60° C	5.0*; 3.5**; 3.0*** 5.0*; 3.5**; 3.0*** --	5.0*; 3.5**; 3.0*** 5.0*; 3.5**; 3.0*** 5.0*; 3.5**; 3.0***	
Adhesion to the factory polyethylene coating and at tape overlap spots under 20±2° C	at least 5.0 kN/m	at least 5.0 kN/m	
Adhesion to the factory polyethylene coating and at tape overlap spots after 1000 hours of testing in water under temperatures of 20, 40 & 60° C	at least 3.5 kN/m	at least 3.5 kN/m	
Area of coating cathodic disbandment, cm <sup>2</sup> , maximum, after 30 days of testing in 3% NaCl under polarization potential 1.5 v with temperature of: 20° C 40° C 60° C	4.0*; 5.0** 8.0*; 10.0** --	4.0*; 5.0** 8.0*; 10.0** 10.0*; 15.0**	
Elongation at failure after 1000 hours of testing at air under 100° C in % of initial value	maximum 25	maximum 25	

\* - for pipe sizes from 1220 mm and more; \*\* - for pipe sizes from 820 to 1220 mm; \*\*\* for pipe sizes under 820 mm.

**Tapes "THERMA-ST" and "THERMA-LKA"**

TU 2245-024-44271562-2007

(replaces TU 2245-002-44271562-00)

(two-layer insulation for pipelines as per GOST R 51164-98)



"Therma-ST" tape is the two-layer insulating material that is comprised of the heat & light-stabilized radiation modified (cross-linked) polyolefin base tape with applied hot melt adhesion layer. "Therma-ST" tape can be supplied complete with the "locking plate" called "Tehrma-LKA".

"Therma-LKA" ("lock" or "locking plate") is the two-layer material, which is armored with the glassy net and used to loop the "Therma-ST" tape into a ring. "Therma-LKA" is supplied as plates. The dimensions are dependent on the width of "Therma-ST" tape and pipe diameter.

The "Therma-ST 40" tape is used to insulate the pipe welding joints with two-layer factory polyethylene coating and the branches with operating temperatures from - 60° C to + 40° C.

The "Therma-ST 60" tape is used to insulate the pipe welding joints with two-layer factory polyethylene coating and the branches with operating temperatures from - 60° C to + 60° C.

"Therma-ST" tape can be supplied in both rolls and measured sections cut per joint of certain pipe size.

**Parameters of produced tape "THERMA-ST"**

"THERMA-ST" tape is manufactured in accordance with TU 2245-024-44271562-2007 with dimensions specified in the Table. Different widths, thicknesses and weights of rolls can be requested by the Client.

Width	Thickness	Roll tape length	Roll diameter
225±2 mm	1.4+0.2 mm	70 st. m.	30±5 cm
350±2 mm	1.8+0.2 mm	50 st. m.	
450±2 mm	2.0 + 0.2 mm	30 st. m.	
650±2 mm	2.4 + 0.2 mm	24 st. m.	

**Parameters of locking plates "THERMA-LKA"**

"THERMA-LKA" locking plates are manufactured in accordance with TU 2245-024-44271562-2007 with dimensions specified in the Table. Different widths and thicknesses can be requested by the Client

Pipe diameter	Thickness of locking plate	Width of locking plate	Length of locking plate (recommended)
up to 159 mm	1.4 mm	Always matches the width of "Therma-ST" tape	80 mm
up to 530 mm			100 mm
up to 720 mm			120 mm
over 720 mm			150 mm

Example of legend required to order the set comprising of "Therma-ST" tape and "Therma-LKA" locking plate that are need for two-layer insulation of welding joins for 1220 mm pipe:  
**"THERMA-ST" 450 x 2.4 mm**  
**"THERMA-LKA" 450 x 150 mm**  
**4000 st. m.**  
**850 ea**

Application details can be found in the second part of this catalogue.


The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under "Instructions for use".

Under the Section "Useful calculations" you may use our on-line calculator "Calculation of cup length for Therma-ST + Therma-LKA", which will calculate the outside diameter of the welding joints as per your input data and offer you the complete set required to insulate the joint as piece of tape "THERMA-ST" and locking plate "THERMA-LKA" with certain lengths, widths and thicknesses (the values you may need to place the order for this set).

Basic Characteristics of “Therma-ST” tape

TU 2245-024-44271562-2007

(Replaces TU 2245-002-44271562-00)

Indicator	Normative as per TU 2245-024-44271562-2007			Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU)  Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a> , page “Products Specifications”   Transportation and storage
	Tape "Therma-ST 40"	Tape “Therma-ST 60"	Tape “THERMA-LKA”	
Appearance	Tape shall not have any wrinkles, breaks, holes or gaps in the adhesion layer			Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means  Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance. Maximum guaranteed shelf life before the usage commencement cannot exceed one
Tensile strength of the base film	At least 15 MPa	At least 15 MPa	--	
Elongation at failure	at least 200%	at least 200%		
Longitudinal shrinkage	20 – 50	20 – 50	not more than 10	
Gel fraction content in the base film	40 - 80 %	40 - 80%	40 - 80%	
Adhesion to steel, under 20±2° C: - for pipe sizes from 1220 mm and more - for pipe sizes from 820 to 1020	at least 5.0 kN/m at least 5.0 kN/m at least 3.5 kN/m	at least 5.0 kN/m at least 5.0 kN/m at least 3.5 kN/m	-- -- --	
Adhesion to steel, kN/m minimum after 1000 hours of testing in water under the following temperatures: • 20 ° C • 40 ° C • 60° C	3.5*; 3.0**; 3.0*** 3.5*; 3.0**; 3.0*** --	3.5*; 3.0**; 3.0*** 3.5*; 3.0**; 3.0*** 3.5*; 3.0**; 3.0***		
Adhesion to the factory polyethylene coating and at tape overlap spots under 20±2° C	at least 5.0 kN/m	at least 5.0 kN/m	at least 5.0 kN/m	
Adhesion to the factory polyethylene coating and at tape overlap spots after 1000 hours of testing in water under temperatures of 20, 40 & 60° C	at least 3.5 kN/m	at least 3.5 kN/m	at least 3.5 kN/m	
Area of coating cathodic distapement, cm <sup>2</sup> , maximum, after 30 days of testing in 3% NaCl under polarization potential 1.5 v with temperature of: 20° C 40° C 60° C	4.0*; 5.0** 8.0*; 10.0** --	4.0*; 5.0** 8.0*; 10.0** 10.0*; 15.0**	-- -- --	
Elongation at failure after 1000 hours of testing at air under 100° C in % of initial value	maximum 25	maximum 25	--	

\* - for pipe sizes from 1220 mm and more; \*\* - for pipe sizes from 820 to 1220 mm; \*\*\* for pipe sizes under 820 mm.

## Cups "THERMA-STMP"

TU 2293-00444271562-2004

(Three-layer insulation for oil pipelines as per GOST R 51164-98)



"Therma-STMP" cups are the insulating materials of the packaged delivery.

The delivery package is comprised of:

- Cup "Therma-STMP" with the polymer adhesion layer, locking plate "Therma-LKA" (as per TU 2245-024-44271562-2007) and the set of two-component epoxy based primer (as per TU 2293-012-44271562-2004) based on calculations per one joint.
- "Therma-STMP" cups are designed for the anticorrosion protection of the welded joints of the steel pipes with two-layer and three-layer polyethylene coatings, pipelines and their branches, shaped objects without limitations on pipe diameters with the service temperature of up to +60 °C.
- "Therma-STMP" cups for the oil industry are manufactured as per TU 2245-011-44271562-2004 as agreed with OJSC "AK" "Transneft". This material has been tested at LLC "Institut VNIIST" with appropriate report issued.

The characteristics of coatings obtained on the basis of "Therma-STMP" cups fully comply with the requirements of GOST R 51164-98 "Main steel pipelines. General requirements for the corrosion protection" and requirements of OJSC "AK" "Transneft" (OTT-04.00-45.21.30-KTH-002-1-03).

The geometry of cups is determined by the diameter and length of non-insulated pipe part. Normally, the standard width of non-insulated pipe edge (the one the manufacturer left uninsulated for welding with other piece of pipe) is 150 mm. Correspondently, when welding two pipes to each other, the welding joint forms with the width of non-insulated part of 300 mm. Standard cup to insulate such joint is 450 mm wide. This is because in addition to the direct insulation of the joint it is necessary to ensure the cup overlap onto the edges of the factory base insulation by at least 50 mm from each side (in accordance to the GOST requirements).

**Parameters of cups “THERMA-STMP”  
(for oil pipelines)**

The dimensions specified in the Table are recommended for pipe of different sizes.

Cups of different widths and thicknesses can be made as agreed between the manufacturer and the end user.

Pipe diameter	Thickness of cup		Width of cup	
	nominal value	limit deviation	nominal value	limit deviation
up to 273 mm	1.4 mm	+ 0.2 mm	350 mm	+5.0 mm
up to 530 mm	1.8 mm		450 mm	
up to 820 mm	2.0 mm		650 mm	
over 820 mm	2.4 mm			

Example of legend required to order the "Therma-STMP" cup 450 mm wide and 2.4 mm thick for 1020 mm pipeline:

**“THERMA-STMP” cup 450 x 2.4 x 1020**

**TU 2245-011-44271562-2004**


**1800 sets**

Application details can be found in the second part of this catalogue.

The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under “Instructions for use”, part 3 of this catalogue.

Basic Characteristics of “Therma-STMP” cups

TU 2245-011-44271562-2004

Indicator	Normative as per TU 2293-004-44271562-2004	<p>Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU) Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means</p> <p>Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance. Maximum guaranteed shelf life for all cup components before the usage commencement cannot exceed one year from point of shipment.</p>
Appearance	The tape shall be free of defects (crimps, bubbles, cracks, breaks, through-holes, discontinuity of adhesive coat)	
Longitudinal rupture resistance of the base film under (20±5) °C	at least 15.0	
Elongation at longitudinal rupture	at least 200%	
Degree of longitudinal shrinkage	not less than 15%, not more than 30%	
Gel fraction content in the base film	not less than 40%, not more than 80%	
Adhesion to the primed steel surface under (20±5) °C: - for pipe sizes up to 820 mm - for pipe sizes over 820 mm	at least 35 H/cm of width at least 50 H/cm of width	
Adhesion to the factory polyethylene coating under (20±5) °C: - for pipe sizes up to 820 mm - for pipe sizes over 820 mm	at least 35 H/cm of width at least 50 H/cm of width	
Transient resistance of coating in 3% NaCl solution under (20±5)°C	initial – at least 10 <sup>10</sup> Ohm/m <sup>2</sup> after 100 days of testing – at least 10 <sup>9</sup> Ohm/m <sup>2</sup>	
Impact coating strength with testing temperature from minus (40±3)°C to plus 40±3)°C: - for pipe sizes up to 273 mm - for pipe sizes up to 530 mm - for pipe sizes up to 820 mm - for pipe sizes over 820 mm	at least 4 J/mm at least 6 J/mm at least 8 J/mm at least 10	
Cracking resistance under (60±3)°C	at least 1000 hours	
Ultraviolet radiation resistance in flow 600 kWh/m <sup>2</sup> under (50±3)°C	at least 500 hours	
Dielectric continuity. Lack of fault under constant voltage.	at least 5.0 kV/mm	

## Cups "THERMA-STMP"

TU 2245-011-44271562-2004

(three-layer insulation for the gas pipelines as per GOST R 51164-98)



"Therma-STMP" cups are the insulating materials of the packaged delivery.

The delivery package is comprised of:

- Cup "Therma-STMP" with polymer adhesion layer;
- Locking plate "Therma-LKA" (as per TU 2245-024-44271562-2007);
- The set of two-component epoxy based primer (as per TU 2293-012-44271562-2004) as calculated for one joint.

"Therma-STMP" cups are designed for the external anticorrosion protection of the welded joints of the underground gas pipelines with external factory polyethylene coatings.

The continuous service temperature range for the "Therma-STMP" cups as per TU 2245-011-44271562-2004 (in the installed state) is from -30 °C to +60 °C in soils of different aggressivity and dampness.

"Therma-STMP" cups for the gas industry are manufactured as per TU 2245-011-44271562-2004 as agreed with OJSC "Gazprom", and have been tested at LLC "VNIIGAZ" with appropriate report issued.

The characteristics of coatings obtained on the basis of "Therma-STMP" cups fully comply with the requirements of GOST R 51164-98 "Main steel pipelines. General requirements for the corrosion protection and requirements of OJSC "Gazprom".

The geometry of cups is determined by the diameter and length of non-insulated pipe part. Normally, the standard width of non-insulated pipe edge (the one the manufacturer left uninsulated for welding with other piece of pipe) is 150 mm. Correspondently, when welding two pipes to each other, the welding joint forms with the width of non-insulated part of 300 mm. Standard cup to insulate such joint is 450 mm wide. This is because in addition to the direct insulation of the joint it is necessary to ensure the cup overlap onto the edges of the factory base insulation by at least 50 mm from each side (in accordance to the GOST requirements).

**Parameters of cups “THERMA-STMP”  
(for gas pipelines)**

The dimensions specified in the Table are recommended for pipe of different sizes. Cups of different widths and thicknesses can be made as agreed between the manufacturer and the end user.

Pipe diameter	Thickness of cup		Width of cup	
	nominal value	limit deviation	nominal value	limit deviation
up to 273 mm	1.4 mm	+ 0.2 mm	350 mm	+5.0 mm
up to 530 mm	1.8 mm		450 mm	
up to 820 mm	2.0 mm		650 mm	
over 820 mm	2.4 mm			


Example of legend required to order the "Therma-STMP" cup 450 mm wide and 2.4 mm thick for 1020 mm pipeline:  
**“THERMA-STMP” cup 450 x 2.4 x 1420  
TU 2245-011-44271562-2004  
800 sets**

Application details can be found in the second part of this catalogue.

The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under “Instructions for use”, part 3 of this catalogue.

Basic Characteristics of “Therma-STMP” cups

TU 2245-011-44271562-2004

Indicator	Normative as per TU 2293-004-44271562-2004	<p>Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU) Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means</p> <p>Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance. Maximum guaranteed shelf life for all cup components before the usage commencement cannot exceed one year from point of shipment.</p>
Appearance	The tape shall be free of defects (crimps, bubbles, cracks, breaks, through-holes, discontinuity of adhesive coat)	
Longitudinal rupture resistance of the base film under (20±5) °C	at least 12.0	
Elongation at longitudinal rupture of the base film	at least 200%	
Degree of full longitudinal shrinkage	25±5%	
Maximum stress of longitudinal heat shrinkage as calculated to the base cross-section	at least 15 g/mm <sup>2</sup>	
Adhesion to the primed steel surface under (20±5) °C	at least 70 H/cm of width	
Tape adhesion to the factory polyethylene coating under (20 ±5 ) °C	at least 70 H/cm of width	
Transient resistance of coating in 3% NaCL solution • initial • after 100 exposition days plus (60±3)°C	at least 10 <sup>10</sup> Ohm/m <sup>2</sup> at least 10 <sup>8</sup> Ohm/m <sup>2</sup>	
Impact coating strength: • with temperature of minus (30±3)°C • with temperature of plus (20±3)°C • with temperature of plus (50±3)°C	at least 8 J/mm at least 4 J/mm at least 2 J/mm	
Breakaway area under polarization after 30 days of testing: • with temperature of (20±3) °C • with temperature of (60±3) °C	not more than 4 cm <sup>2</sup> not more than 15 cm <sup>2</sup>	
Shear strength under temperature of (60±2) °C and load of 0.25 kg/cm <sup>2</sup>	not more than 2 mm	
Dielectric continuity. lack of fault under constant voltage.	at least 5+5 kV/mm	

Tapes "THERMA-R" and "THERMA-RZ"  
 MATERIALS FOR REPAIRS AGAINST PIPELINE COATING IMPERFECTIONS  
 TU 2245-024-44271562-2007  
 (Replaces TU 2245-002-44271562-00)



Heat shrinkage tapes "Therma-R" and "Therma-RZ" are designed to repair the defects of the factory polyethylene coatings of pipes and coatings on the basis of heat-shrinkage tapes. Herewith, tape "Therma-R" is a sort of reinforce patch, and tape "Therma-RZ" is a hot-melt repair filler. Both types of tapes are manufactured as per TU 2245-024-44271562-2007 and supplied in rolls by 50 st. m.

"Therma-R" tape is manufactured as per TU 2245-024-44271562-2007 and has two layers – a layer of radiation modified (cross-linked) polyethylene and a layer of hot-melt adhesive. The tape is reinforced with a woven scrim to enhance the strength properties.

"Therma-R" can be used both independently (to repair the defects of the top coating), and in combination with "Therma-RZ" (to repair the through failures and fill the defective spots of the coating failures).

Being hot-melt, the "Therma-RZ" became of a common use in sphere heat power industry, where it is applied as hot-melt adhesive (glue) for polyethylene heat-shrinkage couplings. These couplings don't carry their own adhesion layer and are widely used when insulating the welded joints of pre-insulated pipes made in "pipe-in-pipe" design. These pipes are the structures made out of steel pipe placed inside the polyethylene shell with the remaining space filled with the heat-insulating layer out of polyurethane foam.

Dimensions of tapes "Therma-R" and  
 "Therma-RZ"

Tapes of different widths and thicknesses can be fabricated as agreed with the Client.

Indicator	Width, mm	Thickness, mm
"Therma-R"	225 $\pm$ 2	1.4 $\pm$ 0.2
"Therma-RZ"	40 $\pm$ 2; 80 $\pm$ 2; 100 $\pm$ 2	2.5 $\pm$ 0.2; 2.5 $\pm$ 0.2; 2.0 $\pm$ 0.2

Example of legend required to order the "Therma-R" tape 220 mm wide and 1.4 mm thick:

**Tape "THERMA-R" 225 x 1.4 50 st. m.**  
**TU 2245-024-44271562-2007**

Example of legend required to order the "Therma-RZ" tape 80 mm wide and 2.5 mm thick:


**Tape "THERMA-R" 80 x 2.5 50 st. m.**  
**TU 2245-024-44271562-2007**

Application details can be found in the second part of this catalogue.

The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under "Instructions for use".

Produced Materials  
Basic Characteristics of tape “Therma-R” and “Therma-RZ”

TU 2245-024-44271562-2007  
(Replaces TU 2245-002-44271562-00)

Indicator	Normative as per TU 2245-024-44271562-2007		
	Tape "Therma-R"	Tape “Therma-RZ”	
Appearance	Tape shall not have any wrinkles, breaks, holes or gaps in adhesion layer		 <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means  Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance. Maximum guaranteed shelf life before the usage commencement cannot exceed one year from the point of shipment.</p>
Longitudinal shrinkage	not more than 10		
Gel fraction content in the base film	40 - 80 %	40 - 80%	
Adhesion to steel, under 20±2° C	--	at least 3.5 kN/m	
Adhesion to steel, kN/m minimum after 1000 hours of testing in water under the temperatures of (20, 40, 60) °C	--	at least 3.0 kN/m	
Adhesion to the factory polyethylene coating and at tape overlap spots under 20±2 °C	at least 5.0 kN/m	at least 5.0 kN/m	
Adhesion to the factory polyethylene coating and at tape overlap spots after 1000 hours of testing in water under temperatures of (20, 40, 60) °C	at least 3.5 kN/m	at least 3.5 kN/m	
Area of coating cathodic disbandment, cm <sup>2</sup> , maximum, after 30 days of testing in 3% NaCl under polarization potential 1.5 v with temperature of (20, 40, 60) ° C: - for pipe sizes over 820 mm - for pipe sizes up to 820 mm	-- --	4.0; 8.0; 10.0 5.0; 10.0; 15.0	

## Tape "THERMA-L"

TU 2245-010-44271562-2004

(Wrapping tape for oil pipelines as per GOST R 51164-98)



"Therma-L" is a heat-shrinkage tape out of radiation modified (cross-linked) polyethylene without an adhesion layer. For the oil pipeline applications, "Therma-L" tape is manufactured as per TU 2245-010-44271562-2004, agreed with OJSC "AK "Transneft". This material has been tested in LLC "Institut VNIIST" with an appropriate report issued. It is used as a protective wrap in the coat designs on the basis of bitumen polymer mastics for the anticorrosion protection of the main pipelines. Initial heat shrinkage point is 60°C, Maximum shrinkage point is 140 °C. The "Therma-L" application technique provides the field tape installation on the mobile units above the hotmelt of mastic layer. "Therma-L" is supplied in rolls. The tape length in roll is 150 st. m. with tape 0.7 mm thick, and 120 st. m. with tape 0.8 mm thick. Weight of roll is 55±5 kg.

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### Dimensions of tape "Therma-L"

Tapes of different widths and thicknesses can be fabricated as agreed with the Client.

Indicator	Normative as per TU 2245-010-44271562-2004
Width	225 <sub>+2</sub>
Thickness	40 <sub>+2</sub> ; 80 <sub>+2</sub> ; 100 <sub>+2</sub>
Tape web length in roll with thickness of:	
- 0.7 mm	at least 140 <sub>±1</sub>
- 0.8 mm	at least 110 <sub>±1</sub>
Spool ID	75-80 mm
Spool OD	85-90 mm

Example of legend required to order 10 tons of "Therma-L" tape 0.8 mm thick and 450 mm wide:

**Tape "THERMA-L" 450 x 0.8;  
TU 2245-010-44271562-2004  
10 tons**

Application details can be found in the second part of this catalogue.


The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company website under "Instructions for use".

Brief instructions for use is available for reading in the third part of this catalogue.

Basic Characteristics of tape “Therma-L”

TU 2245-010-44271562-2004

**(For oil pipelines)**

Indicator	Normative as per TU 2245-010-44271562-2004	<p>Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU) Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means</p> <p>Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance.</p>
Rupture resistance	at least 12 MPa*	
Elongation at rupture	at least 200%	
Change in elongation at rupture after 1000 hours of exposure under 110 °C	not more than 25%	
Electric strength	at least 10 kV/mm	
Longitudinal shrinkage under 140 °C	at least 15%	
Relaxation under temperature of: - 60 °C - 80 °C	at least 4% at least 6%	
Gel fraction content	at least 40%	
Water absorption of tape during 1000 hours under temperature of 20 °C	not more than 0.5%	

\* Rupture resistance of tape can be higher at Client's request.

## Tape "THERMA-L"

TU 2245-020-44271562-2006

(Wrapping tape for gas pipelines as per GOST R 51164-9)



"Therma-L" is a heat-shrinkage tape out of radiation modified (cross-linked) polyethylene without an adhesion layer.

For the gas pipeline applications, "Therma-L" tape is manufactured as per TU 2245-020-44271562-2006, agreed with OJSC "Gazprom". This material has been tested in LLC "VNIIGAZ" with an appropriate report issued. It is used as a protective wrap in the coat designs on the basis of bitumen polymer mastics for the anticorrosion protection of the main pipelines. Initial heat shrinkage point is 60°C, Maximum shrinkage point is 140 °C.

The "Therma-L" application technique provides the field tape installation on the mobile units above the hotmelt of mastic layer.

"Therma-L" is supplied in rolls. Tape length in roll is 150 st. m. with tape thickness of 0.7 mm. Weight of roll is 55±5 kg.

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### Dimensions of tape "Therma-L"

Tapes of different widths and thicknesses can be fabricated as agreed with the Client.

Indicator	Normative as per TU 2245-020-44271562-2004
Width	450 mm
Thickness	0.7±0.1 mm
Tape web length in roll with thickness of 0.7 mm	at least 120
Spool ID	70-80 mm
Roll OD	not more than 500 m

Example of legend required to order 10 tons of "Therma-L" tape 0.7 mm thick and 450 mm wide:

**Tape "THERMA-L" 450 x 0.7;  
TU 2245-020-44271562-2004  
10 tons**

Application details can be found in the second part of this catalogue.

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The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under "Instructions for use".


Brief instructions for use is available for reading in the third part of this catalogue.

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Basic Characteristics of tape “Therma-L”

TU 2245-020-44271562-2006

**(For gas pipelines)**

Indicator	Normative as per TU 2245-020-44271562-20046	Note:
Rupture resistance	at least 12 MPa	<p>To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU) Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means</p> <p>Products shall be kept in the indoor storage, excluding direct sunlight, within at least one meter from any heating appliance.</p>
Elongation at rupture	at least 200%	
Change in elongation at rupture after 1000 hours of exposure under 110 °C	not more than 25%	
Electric strength	at least 10 kV/mm	
Longitudinal shrinkage under 140 °C	at least 15%	
Relaxation under temperature of:		
- 60 °C	at least 4%	
- 80 °C	at least 6%	
Gel fraction content	at least 40%	
Water absorption of tape during 1000 hours under temperature of 20 °C	not more than 0.5%	

## Tape "THERMA-MH"

TU 2245-014-44271562-2006

(Wrapping tape with adhered layer for gas pipelines as per GOST R 51164-98)



"Therma-MH" is a heat-shrinkage tape out of radiation modified (cross-linked) polyethylene with applied bitumen polymer adhesion layer. To prevent the tape stickiness in the roll, the mastic layer will be applied with the release film that is removed immediately prior to usage.

"Therma-MH" is designed to be used as self-adhesive wrap in the coating structures on the basis of the rolled bitumen polymer mastics of cold application (for example, as the covering layer over the rolled reinforced material "RRM"). It is used for the anticorrosion protection of the linear portions of underground main pipelines and their branches with diameter up to 1420 mm, with the service temperature up to 35° C.

"Therma-MH" is manufactured as per TU 2245-014-44271562-2006, agreed with OJSC "Gazprom". This material has been tested in LLC "VNIIGAZ" with an appropriate report issued.

The allowable surrounding temperature during the construction activities is from -30 °C to +50 °C. With the ambient temperature below +5 °C the tape prior to usage will be exposed under the temperature of (20-25) °C (thermal conditioned) for at least 24 hours.

Why is "cold" applied tape is of heat-shrinkage type? "Therma - MH" is a "cold" applied tape, i.e. the bitumen polymer adhesion layer is self-adhesive under the positive temperature and doesn't require any special preheating (the exception is the necessity to thermally condition the tape rolls for 24 hours under positive temperature immediately prior to usage, if the surrounding temperature is below 5 °C). In order to achieve the needed adhesion, it is required to ensure the tape tension force when applying 2 kg per cm.

The scenario, when the benefit of this feature is shown, is the pipe heating with pre-applied insulating layer by the sun stream. During the construction activities in summer time it is not unusual for the pipe to stay for a while unburied (at the ditch edge) under the sun stream. Normally it is ended up with the insulation surface heating (especially if the surface is of black color) as high as 60-75°C. In those conditions different coating behave differently. For instance, the radiation modified heat-shrinkage tape "Therma-MH" will become shorter, thus ensuring the extra tension. Meanwhile, non-heat-shrinkage polyethylene coatings will start relaxing, softening and nonuniformly linearly stretch, with that forming crimps and skirts.

Dimensions of tape "Therma-MH"

Indicator	Normative	Allowable deviation
Total thickness of "Therma-MH" tape	1.7 mm	$\pm 0.2$ mm
Width	225, 450 mm	$\pm 0.2$ mm
Tape web length in roll	60 st. m.	+1 mm
Roll diameter	450 mm	$\pm 50$ mm
Plastic spool ID	70-80m	--


Example of legend required to order 10 tons of "Therma-L" tape 450 mm wide and 1.8 mm thick:

**Tape "THERMA-MH" 450 x 1.8;**  
**TU 2245-014-44271562-2006**  
**10 tons**

Basic Characteristics of “Therma-MH” tape

TU 2245-014-44271562-2006

**(For gas pipelines)**

Indicator	Normative as per TU 2245-014-44271562-2006	<p>Note:</p> <p>To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU). Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage</p> <p>Products can be transported by all transport means in the covered vehicles in the original packing, vertically by not more than 3 rows, under conditions that provide sun and atmospheric protection under temperatures minimum -30 °C and maximum +35 °C. “Therma-MH” tape is not hazardous during transportation and not classified as per GOST 19433 as hazardous freight. In accordance with GOST 12.1.007-78, the tape is referred to the hazard class 4 and not a toxic product. Tape shall be stored in original packing, storage spaces or places protected from sun stream and atmospheric under temperatures minimum -30 °C and maximum +35 °C. Tape rolls shall be transported and stored vertically by not more than 3 rows. Maximum guaranteed shelf life for all cup components before the usage</p>
Longitudinal rupture resistance of the polyethylene base under (20±5) °C	at least 12.0 MPa	
Elongation at longitudinal rupture	at least 200%	
Beam flexibility with bending radius of 10 mm	not more than 20 °C	
Adhesion to the bitumen-polymer coating under 20 °C	at least 10 H/cm	
Tape adhesion in overlap under 20 °C	at least 7 H/cm	
Water absorption of tape in 1000 hours under 60 °C	not more than 5%	
Gel fraction content in the base tape	at least 40%	
Recommended design of the protective coating on the base of materials “PAM” and “Therma-MH”		
<b>Layers in the coating structure</b>	<b>Thickness of layer</b>	
Layer of bitumen-polymer prime coat “Transkor-gaz” TU 5775-005-32989231-2005	at least 0.1 mm	
Two layers of rolled reinforced mastic material “PAM” TU 5774-014-05801845-2004	at least 1.5 mm	
Layer of radiation modified mastic wrapping “Therma-MH” TU 2245-014-44271562-2006	at least 1.7 mm	
Total coating thickness	at least 4.8 mm	

“THERMA-M” band  
 TU 2245-021-44271562-2006  
 (Coating for pipelines as per GOST 9.602-2005)



“Therma-M” is the independent self-adhesive coating, which is a heat-shrinkage band out of radiation modified (cross-linked) polyethylene with applied bitumen polymer adhesion layer. The band is a rolled material. To prevent the band stickiness in the roll, the mastic layer will be applied with the release film that is removed immediately prior to usage.

“Therma-M” is used for the anticorrosion external insulation under factory and route conditions of the steel pipes, branches and tee connections with diameters up to 1420 mm without coating, with polyethylene, polyurethane or epoxy coating with the service temperature from -30 °C to +40 °C.

“Therma-M” is manufactured as per TU 2245-021-44271562-2006, agreed with FSUE “AKH by K.D. Panfilov”, OJSC “Rosgazifikatsia”. This material has been tested at FSUE “AKH by K.D. Panfilov with an appropriate report issued. Allowable surrounding temperature during the construction activities is from -30 °C to +35 °C.

Why is “cold” applied band is of heat-shrinkage type? “Therma-M” is a “cold” applied band, i.e. the bitumen polymer adhesion layer is self-adhesive under the positive temperature and doesn’t require any special preheating (the exception is the necessity to thermally condition the band rolls for 24 hours under positive temperature immediately prior to usage, if the surrounding temperature is below 5 °C). In order to achieve the needed adhesion, it is required to ensure the band tension force when applying 2 kg per cm.

The scenario, when the benefit of this feature is shown, is the pipe heating with pre-applied insulating layer by the sun stream. During the construction activities in summer time it is not unusual for the pipe to stay for a while unburied (at the ditch edge) under the sun stream. Normally it is ended up with the insulation surface heating (especially if the surface is of black color) as high as 60-75 °C. In those conditions different coating behave differently. For instance, the radiation modified heat-shrinkage band “Therma-M” will become shorter, thus ensuring the extra tension. Meanwhile, non-heat-shrinkage polyethylene coatings will start relaxing, softening and nonuniformly linearly stretch, with that forming crimps and skirts.

**Dimensions of band “Therma-MX”**

Indicator	Normative	Allowable deviation
Total thickness of “Therma-M” band	2.0*, 2.3**, 2.8*** mm	±0.2 mm
Width	225, 450 mm	±50 mm
Band web length in roll, st. m.	50; 50; 40	+1 mm
Roll diameter	450 mm	+50 mm
Roll weight	70-80m	+5 kg

\* - to be used in the coating designs # 5, #6 as per GOST 9.602-2005

\*\* - for pipe diameters of 57-426 mm (coating design # 10)

\*\*\* - for pipe bigger than 5330 mm (coating design # 10)

The band is applied in one layer. Several layers are allowed in effort to thicken the coating. Different thicknesses of bands can be fabricated as agreed with the manufacturer.

**Example of legend required to order 60 st. m. of "Therma-M" band 450 mm wide and 2.8 mm thick :**

Band "THERMA-L" 450 x 2.8;

TU 2245-021-44271562-2006


1 roll

Please note that this type of band is delivered in amount of minimum one roll.

Basic Characteristics of “Therma-M” tape

TU 2245-021-44271562-2006

(Coatings for pipelines of various applications)

Indicator	Normative as per TU 2245-021-44271562-2006	<p>Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU). Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means. Tape shall be stored in original packing, storage spaces or places protected from sun stream and atmospherics under temperatures minimum -20 °C and maximum +35 °C. Tape rolls shall be transported and stored vertically by not more than 4 rows. Tape shall be transported in the original packing, under conditions that provide sun and atmospherics protection under temperatures minimum -20 °C and maximum +35 °C. Maximum guaranteed shelf life for all cup components before the usage commencement cannot exceed one year.</p>
Rupture resistance of the polyethylene base	at least 10 MPa	
Impact coating strength: with temperature from -15 °C to + 40 °C	at least 5 J/mm (for sizes up to 73 mm) at least 7 J/mm (for sizes from 325 mm to 530 mm) at least 9 J/mm (for sizes over 273 mm)	
Beam flexibility with bending radius of 10 mm	not more than -15 °C	
Adhesion to the bitumen-polymer coating under 20 °C	at least 25 H/cm	
Tape adhesion in overlap under 20 °C	at least 20 H/cm	
Penetration (indentation) resistance under 20 °C	not more than 0.2 mm	
Dielectric continuity. Lack of fault under voltage.	at least 5 kV/mm	
Funginertness	at least 2 points	
Cracking resistance under base tape stress with temperature of 20 °C	at least 500 hours	
Penetration (indentation) resistance under 20 °C more than 20 °C	not more than 0.2 mm not more than 0.3 mm	

Cups "Therma-MST"  
 TU 2245-021-44271562-2006  
 (Two-layered, bitumen-polymer as per GOST 9.602-2005)



"Therma-MST" cups are insulating materials supplied in packages.

**The delivery package includes:**

- "Therma-M" tape with bitumen-polymer adhesion layer, locking plate "Therma-LKA" (as per TU 2245-024-44271562-2007) and bitumen-polymer prime coat (as per TU 2245-021-44271562-2006).
- "Therma-MST" cups are designed for anti-corrosion protection of welded joints of steel pipes with two-layered bitumen or bitumen-polymer coatings, pipelines and branches, shaped objects with diameter up to 1420 mm with the service temperature up to +60 °C.
- "Therma-MST" cups are manufactured as per TU 2245-021-44271562-2006, agreed with FSUE "AKH by K.D. Panfilov" and OJSC "Roszifikatsia"). This material was tested at FSUE "AKH by K.D. Panfilov", with appropriate report issued.

The properties of coating obtained on the basis of "Therma-MST" cups fully meet the requirements of GOST 9.602-2005 "Unified corrosion and ageing system. Underground structures. General requirements for the corrosion protection."

The cup geometry is determined by the diameter and length of uninsulated pipe portion. Normally, the standard width of non-insulated pipe edge (the one the manufacturer left uninsulated for welding with other piece of pipe) is 150 mm. Correspondently, when welding two pipes to each other, the welding joint forms with the width of non-insulated part of 300 mm. Standard cup to insulate such joint is 450 mm wide. This is because in addition to the direct insulation of the joint it is necessary to ensure the cup overlap onto the edges of the factory base insulation by at least 50 mm from each side (in accordance to the GOST requirements).

**Parameters of cups**

The dimensions specified in the Table are recommended for pipe of different sizes.

Cups of different widths and thicknesses can be made as agreed between the manufacturer and the end user.

Pipe diameter	Thickness of cup		Width of cup	
	nominal value	limit deviation	nominal value	limit deviation
up to 426 mm	2.3 mm	+ 0.2 mm	450 mm	±0.2 mm
up to 1420 mm	2.8 mm			

Example of legend required to order the "Therma-MST" cup 450 mm wide and 1.8 mm thick for 1020 mm pipeline:


**"THERMA-MST" cup 450 x 1.8 x 1020**  
**TU 2245-021-44271562-2006**  
**240 sets**

Application details can be found in the second part of this catalogue.

The detailed operating procedures and guidelines on application will be included as part of purchase order when shipping it to the end user. You can also find them on the Company web-site under "Instructions for use".

Basic Characteristics of “Therma-MST” tape

TU 2245-021-44271562-2006

Indicator	Normative as per TU 2245-021-44271562-2006	<p>Note: To obtain the accurate technical data of the mentioned materials please refer to the appropriate specifications (TU). Full list of TU for our products is available at our web site <a href="http://www.simonyan-company.com">www.simonyan-company.com</a>, page “Products Specifications”</p>  <p>Transportation and storage Products can be transported by all transport means in the covered vehicles in accordance with shipping rules applicable for each transport means. Tape shall be stored in original packing, storage spaces or places protected from sun stream and atmospherics under temperatures minimum -20 °C and maximum +35 °C.  Tape rolls shall be transported and stored vertically by not more than 4 rows. Tape shall be transported in the original packing, under conditions that provide sun and atmospherics protection under temperatures minimum -20 °C and maximum +35 °C. Maximum guaranteed shelf life for all cup components before the usage commencement cannot exceed one year.</p>
Rupture resistance of the polyethylene base	at least 10 MPa	
Impact coating strength: with temperature from -15 °C to + 40 °C	at least 5 J/mm (for sizes up to 73 mm) at least 7 J/mm (for sizes from 325 mm to 530 mm) at least 9 J/mm (for sizes over 273 mm)	
Beam flexibility with bending radius of 10 mm	not more than -15 °C	
Adhesion to steel under 20 °C	at least 25 H/cm	
Tape adhesion in overlap under 20 °C	at least 20 H/cm	
Penetration (indentation) resistance under 20 °C	not more than 0.2 mm	
Dielectric continuity. Lack of fault under voltage.	at least 5 kV/mm	
Funginertness	at least 2 points	
Cracking resistance under base tape stress with temperature of 50 °C	at least 500 hours	
Penetration (indentation) resistance under 20 °C more than 20 °C	not more than 0.2 mm not more than 0.3 mm	

## Support materials and services



## Propane burners

We are completing the customized requests with materials to apply and install the heat-shrinkage tapes. These are such materials as:

- Sievert burners with built-in reducer and accessories (nozzles with diameters up to 60 mm, gas flow rate from 7.5 kg/h to 8 kg/h.
- Heat-resistant chamois gloves (leathers);
- Heat-resistant silicon rubbing-down rollers made by us;
- Contact digital thermometers TK-5.03 (measurement range from -20 °C to +250 °C);
- Primer spreader set \*.

In addition, our company provides free of charge services on training the installation crews how to handle the heat-shrinkage materials produced by us.

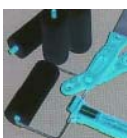
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## Cup application set



## Full cup application set

## Primer spreader set



\* - Primer spreader set is good for 100 joints of pipe with diameter up to 820 mm or for 50 joints of pipe with diameter of 820 mm or more. The set is comprised of 100 foamed rubber changeable rollers, 2 roller handles, 1 spatula for primer mixing.

Efficiency, reliability,  
quality

All materials have the necessary certificates, they passed comprehensive expert evaluation in such Russian scientific centers for construction and operation of main oil and gas pipelines as: VNII on construction and operation of pipelines, fuel-and-power sector (JSC “VNIIST”), VNII on natural gas and gas technologies (LLC “VNIIGAZ”), SUE Labor Red Banner Awarded Public Services Academy by K.D. Panfilov; and they have appropriate usage reports on insulation the various types of pipelines.

The heat-shrinkage materials regardless of their type are subject to the close quality control in the laboratory of us. The materials are checked on compliance with requirements of GOST R 51164-98 and normative and technical documentation. Each product batch comes with the quality certificate that captures the actual values acquired on testing.

The accompanying documents on the order shipment include the instructions for the installation of materials, and, if necessary, the insulating crews are trained on site by us specialists.

Cooperation with the specialists of the research and development establishments, as well as research laboratory on the base of us with the resupplied scientific, control and measuring equipment allow performing the research oriented to the upgrading of current material production and developing of new materials and technologies.

Participation in conferences, seminars and exhibitions devoted to the anticorrosion pipeline protection dictate the company policy oriented to the simplification and easiness of the material handling, search of new solutions, manufacturing techniques and raw materials base.

## GENERAL INFORMATION ABOUT “THERMA” GRADE MATERIALS

Our products range is rather wide and meets any demands related to the pipeline operation and construction. We produce materials to repair the insulation failures, tapes for the anticorrosion protection of the tubulars with formation of two-layer coatings, cups for anticorrosion protection of the pipe welded joints with formation of two- or three-layer coatings, materials to insulate the bent branches and shaped objects, including the flange connections. The physical properties of our materials allow using them for both canal and canal-free techniques of the pipe laying.

### Main advantages versus other insulating materials.

- The wide range of the insulating materials allow applying both single-layer and multi-layer anticorrosion coatings and meeting all demands related to the pipeline operation and construction.
- The application can be made both under factory and field (route) conditions (both in summer and in winter in wide temperature ranges).
- The insulation properties thus are not worse than those of the base factory polyethylene factory insulation.
- All materials are delivered 100% ready for use.
- Easy to apply
- The resulted applied insulating coatings ensure the corrosion protection for at least 30 years.
- Availability of various adhesive materials allows making both hot applied materials (with heat preheat) and cold applied materials (without pipe preheating).
- All heat-shrinkage tape materials of “Therma” grade are made on the base of radiation modified polyethylene of enhanced physical properties versus the regular polyethylene.
- “Therma” heat-shrinkage tapes are light-stabilizing and can be used to insulate not only underground pipelines, but also aboveground pipelines without risk of UV, solar radiation exposure, temperature drops, still keeping their properties.
- The product quality is time-tested on the sites of leading oil & gas companies and proved to be as good as of the best western analogues, with that having lower price. Shorter periods of production and delivery.
- Long experience in development and production of various insulating materials and packaged anticorrosion coatings (from epoxy resins and miscellaneous bitumen, bitumen-polymer, polymer adhesives to heat-shrinkage radiation cross-linked polyethylene) allows us manufacturing and delivering the exclusive customized materials requested by the large Clients.

### Types of adhesive layers for “THERMA” grade insulating materials, “cold” and “hot” application techniques.

The total product line can emphasize as individual class the heat-shrinkage tapes with adhesion layer. These are insulating materials produced as two-layer tapes, the base for such tapes is the light-stabilized, radiation modified (cross-linked) polyethylene with pre-applied adhesion (gluing) layer. The main difference between the tapes of this class is the type of adhesion layer. The layer can be self-adhesive under normal temperatures or hot melt.

- The tapes with self-adhesive layers are called “tapes of cold application”. They are delivered in rolls, which have release interlaying film between the laps to prevent the tape sticking inside the roll during storage and transportation. The release interlaying film is removed immediately prior to usage, and the tape is applied on the insulated surface with adhered layer inside and glued to it under normal temperature. Tapes of this type are: “Therma-MX” and “Tehrma-M” with bitumen polymer adhesion layer. This application technique that doesn't require to heat the surface is called “cold application”. However, these tapes are produced on the base of the heat-shrinkage polyethylene back with applied adhesion layer. This allows, if needed, “shrinking” the tape (already applied onto the cold surface), for example, in order to compensate the inadequate tape tension when applying it onto insulated surface, or in order to ensure the best covering of the surface irregularities. The additional benefit of the heat-shrinkage polyethylene back at “cold application tapes” is the ability to conduct the construction activities, when the insulated pipe stayed unburied for a long time under sun stream exposure. In this case, being exposed to the sun heat, the insulation won't crack or sag, forming pockets and crimps, but instead additionally wrapping around the pipe.

• Tapes with hot-melt adhesion layer are called "hot application tapes". The hot-melt adhesion layer is not sticky under normal temperatures, and to ensure its gluing to the insulated surface it shall be pre-heated up to the significant temperature (70-120 °C depending on the type of insulating material). These are such tapes as "Therma-40", "Therma-60", "Therma-ST 40", "Therma-ST 60" and cups "Therma-STMP". This application method that requires the pre-heating of the surface to be insulated is called "hot" application technique. The above tapes are delivered in rolls, in some cases the release film can be laid between the tape laps to prevent the partial tape sticking inside the roll during its storage and transportation. For reference: in summer time in the middle latitudes the black surface may warm up under the sun exposure as high as 60 °C and more. All above "hot application tapes" are of heat-shrinkage type and may have the longitudinal shrinkage from 10% to 50%, which allows using them to insulate the bent branches, shaped objects, spots of staged or tapered crossings of pipeline diameters, etc.

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#### Support equipment required to apply the insulating materials «THERMA»

The pipe insulation by means of lap-winding process can be semi-machine or manual. The semi-machine method assumes usage of manual insulating "squirrel-cage" type machines similar to "MIRT". If the manual application method is the main for the "cold application tapes", then you may need the following support equipment:

- rubbing-down roller;
- knife;
- gas burner with reducer, hose and propane bottle (if the shrinking is required).

"Hot application" tapes may need the following support equipment:

- gas burner with reducer and hose
- heat-resistant rubbing down roller;
- heat-resistant leathers;
- contact thermometer.

Please address us for the details about purchasing the support equipment, including manual mechanical insulating machines.

## Steel main pipelines as per GOST R 51164 and other pipelines as per GOST 9.602 with the heat carrier temperature of up to +60 °C

All insulating coatings for the main pipelines are regulated by GOST R 51164. The insulating coating for steel pipelines that not considered as mains (water lines, water ducts, sewerage, non-main gas pipelines, etc) are regulated by GOST 9.602.

#### Insulating the pipe welded joints in the factory polyethylene insulation

In accordance with Section 4.6 of GOST R 51164-98: "Characteristics of insulation for block valve stations and deformed reinforcing bars, as well as for the pipe welded joints with factory or base insulation shall correspond to the pipe insulation". This requirement is fair not only for the main pipelines, but also for any other pipeline type. Therefore, certain cups are to be used to insulate the pipe welded joints based on the type of the base insulation for the tubulars.

#### THREE-LAYER POLYMER CUP WITH EPOXY PRIMER "THERMA-STMP". *Three-layer polymer epoxy insulation of the welded joint.*

Today, the new construction processes usually use the pipe with three-layer insulation on the extruded polyethylene base. To insulate the welding joint spots, we recommend using the heat-shrinkage cups with two-component primer on epoxy base "Therma-STMP". These cups are delivered as package, which is designed for the specific pipe size and comprised of the following: two-layer cup with polymer hot-melt adhesion layer, locking plate (to lock the cup into the ring around the welded joint); two-component primer

On epoxy base. The joint insulation after the cup installation is three-layered, completely matching the factory base insulation and having as good physical and mechanical properties. This type of insulation complies with GOST R 51164 and GOST 9.602.

#### TWO-LAYER POLYMER CUP “THERMA-ST”.

*Two-layer polymer insulation of the welded joint.*

In some cases, when the two-layered insulation, we recommend using the cups without the epoxy primer. These cups come in packages designed for the specific pipe size. The package includes the tape section “Therma-ST” of certain length and locking plate “Therma-LKA”. At the Client’s request, “Therma-ST” tape can be delivered in rolls (then he will cut the tape by cups himself), which are appended with certain number of locking plates (equal to number of joints to be insulated). If you need to clarify the cup length depending on the pipe size and yourself cup the “Therma-ST” tape, then you can any time address to our specialist and receive details or independently calculate the cup length with the help of our on-line calculator located on the company web-site [www.simonyan-company.com](http://www.simonyan-company.com), Chapter “[Tapes => Useful calculations => Calculation of the cup length](#)”. This type of welded joint insulation complies with GOST R 51164 and GOST 9.602.

#### TWO-LAYER BITUMEN POLYMER CUP “THERMA-MST”

*Two-layer polymer bitumen insulation for the welded joint.*

For the cold insulation of the welded joints of the pipelines (Ø up to 1420 mm), you shall use the bitumen-polymer cup “Therma-MST”. This type of cups comes in package that includes: “Therma-MST” cup designed for the certain pipe diameter, bitumen-polymer prime coat, and locking plate “Therma-LKA”.

The application procedure is as follows:

- treat clean the steel pipe surface to the 3<sup>rd</sup> degree as per GOST 9.402 80;
- if needed (if the ambient temperature is lower than +10 °C), the pipe surface is pre-heated to +15 - +40 °C;
- apply polymer-bitumen prime coat onto the pipe surface;
- apply the polymer-bitumen self-adhesive cup “Therma-MST”;
- install the locking plate “Therma-LKA”;
- shrink the cup (if required).

This type of welded joint insulation complies with GOST 9.602.

#### **Insulation of tubulars by means of lap-winding process**

Main types of today used anticorrosion coatings for the pipelines are polymer and composite bitumen-polymer coatings. Therewith the majority of the produced pipes have the base factory three-layer polymer insulation. Meanwhile, the composite bitumen-polymer coatings became of common use rather not for pipe insulation in factory or base conditions, but in activities on the re-insulation of the pipeline linear portions.

#### INSULATING THE TUBULARS AND BRANCHES BY MEANS OF “HOT” LAP-WINDING PROCESS.

• *Insulation of pipes in factory conditions with application of three-layer polymer coating (GOST R 51164-98, design # 1 in table # 1, as well as GOST 9.602-2005, design # 1 in table #6).*

The application procedure is as follows:

- treat clean the steel pipe surface to the 2<sup>nd</sup> degree as per GOST 9.402 80;
- heat the pipe to 40-60 C;
- apply two-component primer (of our make);
- heat the pipe with applied primer to 90-110 C;
- wind two-layer heat-shrinkage tape “Therma-40” or “Therma-60”.

Note: heat the pipe, apply primer and wind the tape in steps, by sections with length that will allow maintaining the required temperature range.\*

• *Insulation of pipe in factory and route conditions with application of two-layer polymer coating GOST R.602-2005, designs # 1 and # 9 respectively in table # 6. as well as GOST R 51164-98, designs # 2 & 8 in table # 1).*

The application procedure is as follows:

- treat clean the steel pipe surface to the 2<sup>nd</sup> degree as per GOST 9.402 80;
- heat the pipe with applied primer to 90-110 C;
- wrap two-layer heat-shrinkage tape “Therma-40” or “Therma-60”. Note: heat the pipe and wind the tape in steps, by sections with length that will allow maintaining the required temperature range.\*

INSULATING THE TUBULARS AND BRANCHES BY MEANS OF “COLD” LAP-WINDING PROCESS. Insulation of pipes in the base and route conditions with application of polymer-bitumen coating “Therma-M” (as per GOST 9.602-2005, designs # 8 and # 10 in table 6).

The application procedure is as follows:

- treat clean the steel pipe surface to the 3<sup>rd</sup> degree as per GOST 9.402 80;
- if needed (if the ambient temperature is lower than +10 °C), the pipe surface is pre-heated to +15 - +40 °C;
- apply the polymer-bitumen prime coat onto the pipe surface;
- wind the polymer-bitumen self-adhesive tape “Therma-M”.

RE-INSULATING THE LINEAR PORTIONS OF MAIN PIPELINES BY MEANS OF “HOT” PROCESS. *Pipe insulation in the route conditions with application of combined mastic-polymer reinforced coating (GOST R 51164-98, design # 6 in table # 1).*

The application procedure is as follows:

- treat clean the steel pipe surface to the 3<sup>rd</sup> degree as per GOST 9.402 80;
- heat the pipe up to 60-110C;
- apply the bitumen or bitumen-polymer prime coat;
- apply the hotmelt of bitumen modified mastic.
- wind the protective layer – one-layer heat-shrink wrapping tape (Without adhesive layer) “Therma-L”.

Note: The wrapping tape is shrunk on account of contact with the mastic melt and adheres to it, thus forming the solid coat.

In addition, for all coating designs listed in this GOST R 511644, wherever the protective polymer wraps are used - it is possible to use the wrapping tape without the adhesive layer "Therma-L".

**RE-INSULATING THE LINEAR PORTIONS OF MAIN PIPELINES BY MEANS OF "COLD" PROCESS.** *Pipe insulation in the route conditions with application of band type polymer-bitumen reinforced coating (GOST R 51164-98, design # 18 in table # 1).*

The application procedure is as follows:

- treat clean the steel pipe surface to the 3<sup>rd</sup> degree as per GOST 9.402 80;
- pre-heat the pipe to 60-110 C;
- apply bitumen or bitumen-polymer prime coat;
- apply the polymer-bitumen tape at least 1.5 mm thick in 2 layers;
- wind the protective layer – two-layer heat-shrinkage wrapping tape with the bitumen-polymer adhered layer "Therma-MX".

In addition, for all coating designs listed in this GOST R 511644, wherever the protective polymer wraps with adhered layer are used - it is possible to use the wrapping tape with the adhered bitumen-polymer layer "Therma-MX".

**Repairing the fault locations at the factory polyethylene insulation and insulation on the basis of heat-shrinkage tapes**

Use materials "Therma-RZ" and "Therma-R" in order to repair the failures on the polyethylene insulation of pipes due to storage, transportation and construction activities. The repair is effected by means of filling the insulation fault spot with the flux of hot-melt repairing filler "Therma-RZ" followed by installation of the repair reinforced patch "Therma-R".

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## Steel main pipelines as per GOST R 51164

**Insulating and re-insulating the linear portion of the main pipelines**

**Pipe insulation in the factory conditions with application of three-layer polymer reinforced coating (GOST R 51164-98, design # 1 in table # 1).**

Procedure is as follows:

- treat clean the steel pipe surface to the 2<sup>nd</sup> degree as per GOST 9.402 80;
- heat the pipe to 15-40 C;
- apply two component primer (produced by CJSC "Therma") on epoxy base;
- heat the pipe with applied primer up to 90-110 C;
- wrap two-layer heat-shrinkage tape "Therma-40" or "Therma-60".

Note: heat the pipe, apply primer and wind the tape in steps, by sections with length that will allow maintaining the required temperature range.\*

**Pipe insulation in the factory conditions with application of two-layer polymer reinforced coating (GOST R 51164-98, designs # 2 & 8 in table # 1).**

Procedure is as follows:

- treat clean the steel pipe surface to the 2<sup>nd</sup> degree as per GOST 9.402 80;
- pre-heat the pipe to 90-110 C;
- wrap two-layer heat-shrinkage tape "Therma-40" or "Therma-60".

Note: heat the pipe, apply primer and wind the tape in steps, by sections with length that will allow maintaining the required temperature range.\*

**Pipe insulation in the factory conditions with application of combined mastic-polymer reinforced coating (GOST R 51164-98, design # 6 in table # 1).**

Procedure is as follows:

- treat clean the steel pipe surface to the 3<sup>rd</sup> degree as per GOST 9.402 80;
- heat the pipe up to 60-110C;

- apply bitumen or bitumen-polymer prime coat;
  - apply the flux of bitumen modified mastic;
  - wind the protective layer – one-layer heat-shrinkage wrapping tape (without adhesive layer) "Therma-L".
- Note: The wrapping tape is shrunk on account of contact with the mastic melt and adheres to it, thus forming the solid coat.

**Pipe insulation in the route conditions with application of band type polymer-bitumen reinforced coating (GOST R 51164-98, design # 18 in table # 1).**

Procedure is as follows:

- treat clean the steel pipe surface to the 3<sup>rd</sup> degree as per GOST 9.402 80;
- pre-heat the pipe to 60-110 C;
- apply bitumen or bitumen-polymer prime coat;
- apply polymer-bitumen tape at least 1.5 mm thick in 2 layers;
- wind the protective layer - two-layer heat-shrinkage wrapping tape with bitumen-polymer layer "Therma-MX".

In addition, for all coating designs listed in this GOST, wherever the protective polymer wraps are used - it is possible to use the wrapping tape without the adhesive layer "Therma-L". For the structures that use the protective polymer wraps with adhered layer, it is possible to use the wrapping tape with the adhered bitumen-polymer layer "Therma-MX".

**Repairing the fault locations at the factory polyethylene insulation and insulation on the basis of heat-shrinkage tapes**

Use materials "Therma-RZ" and "Therma-R" in order to repair the failures on the polyethylene insulation of pipes due to storage, transportation and construction activities. The repair is effected by means of filling the insulation fault spot with the flux of hot-melt repairing filler "Therma-RZ" followed by installation of the repair reinforced patch "Therma-R".

## HEAT SUPPLY SYSTEMS AND OTHER PIPELINES WITH THERMAL INSULATION

### Insulating the joints of pre-insulated pipes

*The welded joints of pre-insulated pipes can be insulated by two basic methods, depending on the type of thermal insulation of the joint:*

- In cases when the heat insulation of the connection joints uses the polyurethane foam shells, the flashing is effected by installing the cup that consists of the piece of tape “Therma-ST 60” and locking plate “Therma-LKA”.
- In cases when the heat insulation of the connection joints uses the filling with the polyurethane foam through the opening in the heat-shrinkage couplings (which is also a “formwork” during the filling process). It is not unusual for these couplings to be made by manufacturers that produce the plastic jackets for the heat-insulated pipes (the couplings don't have the adhesive layer and can be field secured by means of welding with the jackets of pipe for insulation using the electrical heating coils). We offer the alternative, easier and quicker installation method:
  1. First, apply hot-melt tape adhesive “Therma-RZ” onto the edges of pipe jackets (sheaths).
  2. Then, the joint is fitted with the coupling out of polyethylene sheath, and its edges are getting shrunk using the gas burner. When shrinking, the coupling edges get warmer and at the same time melt the tape adhesive “Therma-RZ”, which additionally adheres the coupling edges with the edges of polyethylene sheath of pipes.
  3. Next, for guaranteed joint protection from moisture and to enhance the mechanical strength of the structure, narrow cups get installed and shrunk on the coupling edges. These cups are comprised of the heat-shrinkage tape “Therma-ST” and locking plate “Therma-LKA”.

### Insulating the linear portion above the heat-insulating layer

The heat-shrinkage tapes can be used to form the covering damp-proof course (layer) over the heat-insulating layer applied on the pipes. Depending on the pipeline placement type, we recommend the particular sort of the heat-shrinkage tapes. Even when the heat-insulating layer is using the materials, where the adhesion is impossible (mineral wool, for instance); the continuity of the covering damp-proof layer will be ensured on account of the self-adhesion of the heat-shrinkage tape in the spots of the intertrun overlap. When the tapes are applied, the special solid damp-proof cover is formed. Low heating capacity and thermal conductivity of the heat-insulating layer sort of revises the usage process for the “hot application tapes”, making it simpler (there is no need to pre-heat the surface to be insulated).

- With canal-free underground placement of pipes with thermal insulation (whatever kind it is), it is possible to use the “cold application tape” with bitumen-polymer adhesive layer “Therma-M”. The tape is simply wound by spiral (lap) without

any preliminary surface treatment. The usage of this insulation technique is feasible, when the application easiness and low material cost are critical.

- With canal or canal-free underground placement and with aboveground placement, it is possible to use the “hot application tape” with polymer adhesive layer “Therma-60”. In case of aboveground placement it is recommended to use tape “Therma-60” of silver or yellow color (it reduces the heating of the covering damp-proof course under sun stream exposure). The tape is wound by spiral without any pre-treatment of the surface to be insulated and in course of application the tape get shrunk by temperature action of the applied tape turns onto the external surface.

### Insulating the end part of pre-insulated pipes

Damp-proofing of the end part of pre-insulated pipes from the ingress of moisture into the unprotected end of the heat-insulating layer by means of installation of end cups (for the period of transportation and storage). The main advantage over the ready-made plug is that the cup has no limitations on the least out of two diameters; the cup will become shorter and will repeat the smaller diameter only in the course of the temperature shrinkage. Unfortunately, when using various mastics to resolve this problem, it often happens that because of the thermal expansions the jackets flake off the heat-insulating layers with the formation cracks in the mastic coating, which may lead to the ingress of moisture into the heat-insulating layer and its dampening through the end part during the storage. The usage of the heat-shrinkage “hot application tape” “Therma-ST” with larger shrinkage degree fully resolves this problem.

**PROPOSAL TO THE  
MANUFACTURERS OF PIPES  
IN THE THREE-LAYER  
INSULATION BASED ON THE  
EXTRUDED POLYETHYLENE**

**WE CAN OFFER YOU:**

- Delivery of exclusive proprietary granular adhesive;
  - delivery of sets of cups "Therma-STMP" to insulate joints, and sets of "Therma-R" + "Therma-RZ" to repair failures at the factory base insulation (that took place during transportation, storage or construction activities) and support equipment to apply the materials – all in order to provide full procurement of pipes on an ex-works basis complete with all insulating materials that are needed for the pipeline construction.
- 

**PROPOSAL TO THE  
MANUFACTURES OF PRE-  
INSULATED PIPES**

**WE CAN OFFER YOU IN EFFORT TO PROVIDE  
COMPLETE SETS OF MANUFACTURED PRODUCTS:**

- Delivery of the tape adhesive for heat-shrinkage couplings (made out of jackets) "Therma-RZ";
  - Delivery of heat-shrinkage tape "Therma-ST" for additional backup damp-proofing of the edges of the heat-shrinkage couplings (made out of jackets);
  - Delivery of bitumen-polymer tape "Therma-M" or tape "Therma-ST" to seal off the ends of pre-insulated pipes from ingress of moisture into the heat-insulating layers during storage and transportation.
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**PROPOSAL TO THE  
MANUFACTURERS OF  
THERMAL INSULATING  
MATERIALS**

**WE CAN OFFER YOU IN EFFORT TO PROVIDE  
COMPLETE SETS OF MANUFACTURED PRODUCTS:**

Delivery of tapes "Therma", "Therma-ST" (any color, including silver), tape "Therma-M" (black) to apply the damp-proof protective layer over the thermal insulation on polyurethane foam base, mineral wool base, etc. The resulting coating will ensure protection of the heat-insulating layer from the ingress of moisture during both canal and canal-free pipeline placement.  
Note: It is possible to use tapes "Therma" and "Therma-ST" of silver color even on application of damp-proof course onto the pipeline with aboveground placement.

## INSTRUCTIONS FOR INSULATION OF LINEAR PORTIONS AND BRANCHES

with heat-shrinkage “THERMA” tapes by means of lap-winding process

1. The branches are insulated with the heat-shrinkage tapes “Therma-40”, “therma-60”, “Therma-ST 40” and “Therma-ST 60” (TU2245-002-44271562-00) that meet the requirements for the route coatings as per GOST R 51164-98.

2. The following tools are needed to prepare the surface for insulation:

- grinder with round metal cord brushes;
- sandblast unit;
- knife, files, emery paper;
- contact thermometer;
- gas burners with hoses, reducers and bottles with propane gas;
- rubbing-down rollers;
- rags.

3. Treatment of surface subject to insulation

- 3.1. Using the knife, emery paper and rags remove the residual dirt, ice, etc. from the surface for insulation.
- 3.2. Using the grinder with metal cord brushed or sandblast unit clean the pipe surface from rust to the 2<sup>nd</sup> degree of treatment as per GOST 9.402-80 (grinder can be used for pipe sizes not more than 325 mm). When the treatment is over, the surface shall be of the light-grey color, free of rust, scales, dust or grease spots. Sharp edges of the factory insulation shall be smoothed.
- 3.3. Remove dust and grease from the surface with the clean rags.

4.0. Application of epoxy primer \*

- 4.1. Heat on water bath the tanks “A” and “B” along with the primer components up to  $35\pm 5$  °C (higher temperature shortens the life of the primer).
- 4.2. Vigorously squeeze component “B” from the tube into the plastic container containing component “A”.
- 4.3. Blend the components “A” and “B” together with the spatula till the uniform mixture.
- 4.4. Heat the steel surface with the sootless burner flame up to 40-60 °C. The surface shall be free of soot, which is reached through the burner adjustments.
- 4.5. Unload the ready mix from the tank onto the piece of steel pipe and with foamed rubber roller lay the mixture onto the steel surface with layer 100-200 microns thick. The mix shall be unloaded onto the pipe not later than within 5 minutes after its readiness.
- 4.6. Heat the primer on the pipe with the soft flame of gas burner until it cures under

$110\pm 5$  °C, not allowing its overheat and ample gas release. The degree of primer cure is tested on aftertack (primer shall not stick and soil).

5. Winding the heat-shrinkage tape

Heat the surface the pipe with the two propane burners to the following temperatures:

- for Therma-40, Therma-ST40 - 110-120 °C
- for Therma-60, Therma-ST 60 — 120-130 °C

The time of heat shall be chosen based on the air temperature and wind force so that during the next tape application the pipe metal temperature is not lower than the application temperature. Monitor the temperature on the metal surface in the process of heating using the contact thermometer.

- 5.1. The tape winding angle and correct stripe length selection will clarified by means of tentative (try-on) winding of tape onto the cold surface of piece for insulation. The overlap of turns shall be chosen based on the manufacturer's recommendations.
  - 5.2. 100-150 mm from the end of the prepared roll heat the adhesive base until the adhesive softens, not allowing the shrinkage of the polyethylene layer.
  - 5.3. Place the heated tape end at the level of one or two o'clock on the pipe by pre-applied marks under the winding angle that provides the proper overlap.
  - 5.4. Apply and press the heated tape end to the hot pipe.
  - 5.5. The shrinkage operation shall be effected from the beginning of the tape winding moving along the spiral, pre-heating the internal (adhesion) tape layer, shrinking each turn, squeezing air from under the tape.
  - 5.6. Finish the shrinkage process with wide burner movements along entire surface of the insulated piece; and before pipe and tape cool off, remove the residual air, smoothing the coating with hands in protective gloves or with the rubbing-down rollers.
6. Quality control for the coating in the area of branch under insulation shall be effected in accordance with GOST R 51164-98 as follows:
- visual inspection;
  - continuity control of coating with spark defectoscope,
7. The pipe will be sunk into the trench or earth backed after the full cooling of the coating and pipe.

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\* - the resulting insulating coat will have three layers and meet the requirements for the route coating as per GOST R 51164-98. In order to get two-layered insulating coat, which would also meet the requirements for the route coating as per GOST R 51164-98 – just skip step 4 herein.

Mechanical treatment of surface  
subject to insulation application

Pre-heat the surface of pipe  
subject to insulation application

Apply of epoxy primer onto the  
pipe surface

Heat and dry the applied epoxy  
primer

Wind the heat-shrinkage tape

Temperature shrinkage of applied  
tape.

## INSTRUCTIONS FOR INSULATION OF JOINTS

with heat-shrinkage “THERMA-ST” tapes with “THERMA-LKA” locking plate

1. Polymer coating “Therma-ST” is the heat-shrinkage tape, which is designed for anticorrosion protection of the welded joints of pipes.

Heat-shrinkage tape has two layers: radiation cross-linked polyethylene and thermoplastic adhesive. The tape comes in rolls or as sections per one joint. The locking tape “Therma-LKA” comes complete with the tape and is designed to glue the tape in the overlap spot.

### 2. Coating application equipment

“Therma-ST” coating can be applied only by the trained workers. The following equipment is required to prepare the surface for coating:

- gas burner – 1 ea;
- propane bottle c/w reducer - 1 ea;
- 10 m connecting gas hose – 1 ea;
- contact thermometer with measuring range 0 thru 150 °C;
- rubbing-down roller;
- heat-resistant gloves, mittens, safety helmets, glasses;
- grinder, file, emery paper.

### 3. Surface treatment technique for the coating application

3.1. Preparatory mechanical treatment of the pipe steel surface.

Using grinder, file or emery paper, remove burrs and sharp fins from the pipe steel surface.

3.2. Drying the surface for insulation.

Using the gas burner, heat the surface for insulation up to 40 °C. Check the surface temperature with contact thermometer or pyrometer. The heated surface shall be free of soot, which is reached by means of burner flame adjustment.

3.3. Final mechanical treatment and cleaning of pipe steel surface.

Using sandblast unit or emery paper, treat the pipe surface to the 2<sup>nd</sup> cleaning degree as per GOST 9.402-80. When the treatment is over, the pipe shall be of light-grey color and free of rust and scale. The pipe surface shall be grease free (in case there are grease spots, wipe them out with rags dampened with white-spirit or other solvent) and dust free (dust shall be removed with dry clean rags).

3.4. Treatment of the factory coating.

To ensure proper shrinkage of polymer coating, smooth the sharp edges of the factory insulation. It is recommended to skew the edges with grinder or file under at least 30° to the pipe axis. The factory insulation shall be treated with the sandblast unit or emery paper 100 mm away from the edges from both sides from the welded joint. Wipe entire treated pipe area with clean dry rags.

### 4. Heating the surface for insulation

Heat both steel surface and factory polyethylene coating up to  $110 \pm 5$  °C at 75 - 100 mm from the joint

(Localized overheating up to 120 °C is allowed). The surface shall be free of soot, which is reached by means of burner adjustment.

### 5. Installation of heat-shrinkage tape “Therma-ST”

5.1. Preparing “Therma-ST” tape.

Across the tape width cut off 2 angles 50 mm edgewise and 15 mm lengthwise. If tape comes in a roll, then cut the needed dimensions in accordance with recommendations.

5.2. Installing “Therma-ST” tape onto the pipe.

Wrap the tape around the pipe with polyethylene coating with small slack on bottom. Tape overlap shall be at least 100 mm and placed on the side of pipe; tape end with cut angles will be located under the overlap; tape width shall cover the factory coating from both ends from the welded joints by at least 75 mm. Heat the internal tape layer with the burner flame in the overlap spot (do not allow the polyethylene shrinking) and press the tape using the roller or heat-resistant gloves.

5.3. Installation of locking plate “Therma-LKA”.

Locking plate “Therma-LKA” will be installed onto the overlap of heat-shrinkage tape with polyethylene layer up, and the middle of overlap shall go in-between the locking plate. Prior to installation, heat the adhesion layer of the plate until adhesive visually melts. Then place the locking plate on the overlap and heat it with yellow burner flame until overlap contours appear and tape glue bleeds out. Then compact the locking plate with roller or heat-resistant gloves; if needed, remove air bubbles from under it.

5.4. Thermal shrinking of the resulted cup.

Start shrinking the resulted cup right after installing the locking plate “Therma-LKA”. Shrinkage is performed using the gas burner. The burner flame shall be yellow and oriented in opposite wind direction. Shrink the tape from the welded joint one way, then from the welded joint other way. In doing so, the tape slack is shrunk, and tape tightly covers pipe around entire surface. Shrink the tape by moving the burners along the pipe diameter not heating the locking tape. Smooth bubbles and crimps of the shrink tape with roller or heat-resistant gloves.

### 6. Requirements for the joint insulation

- The heat-shrinkage tape shall tightly cover the insulated surface of metal and factory coating of pipe and have the surface, which is free of bubbles, crimps, folds or traces of polyethylene burn.

- The profiles of pipe welded joint and tape overlap shall show through the insulation.

- Adhesive will appear from both ends of joint, on the factory coating. Adhesive shall show several millimeters along entire pipe diameter.

- Tape shall lap over the factory coating by minimum 50 mm from both sides from the joint.

Mechanical treatment of welded joint  
surface subject to insulation application

Pre-heat the surface of welded joint subject  
to insulation application

Preparing “Therma-ST” cup.

Install the locking plate “Therma-LKA” to  
loop “Therma-ST” cup into a ring

Thermal shrinkage of installed cup

Appearance of prepared structure

## INSTRUCTIONS FOR INSULATION OF PIPES IN THE POLYURETHANE FOAM with “THERMA” and “THERMA-ST” tapes by means of lap-winding process

### 1. Surface treatment

Polyurethane foam pipe insulation shall be preliminarily cleaned from coarse dirt and oil.

### 2. under negative temperatures:

Prior to winding, thermally condition the rolls for at least 5 minutes with the temperature of 20-25 °C.

### 3. Tape overlap is 25-30 mm.

### 4. “Therma” and “Therma-ST” tapes are wound on pipe as follows:

- apply the roll end with pre-heated adhesion layer to the pipe and compact it with heat-resistant roller (to ensure the proper winding angle, the roll end shall be of triangle shape and one side of angle shall be applied to the pipe end);
- wrap the roll with the tape around the pipe (one turn) with overlap;
- shrink the pipe-wound tape in one turn. Shrink using the gas burner and remove air from under the tape with heat-resistant roller;
- then this technique repeats; adjust the winding angle as needed (to facilitate the winding, it is recommended to slightly heat the tape piece prior to winding from the side of adhesion layer).

### 5. Roll change:

- apply the end of wound roll to the pipe and compact it with heat-resistant roller;
- On the top apply the tail of new roll to the end of wound roll by 50-100 lengthwise and compact it with heat-resistant roller (slightly pre-heat the adhesive coat of new roll with the gas burner).
- Install the locking plate “Therma-LKA” at the tail of new roll. The locking plate is placed at overlap spot with polyethylene layer up, and the middle of overlap shall pass in-between the locking tape. Prior to installation of the locking plate “Therma-LKA”, pre-heat its internal adhesion layer under polyethylene. Then, place the locking plate at the overlap and heat it with yellow burner flame and at the same time compact it using the rubbing-down silicon roller until the overlap contours appear and glue exudes along the edges of locking plate.

### 6. Coating appearance

Uniform surface free of gaps, breaks, looseness, bubbles, crimps or folds. Glue shall exude in the overlap area minimum by 2 mm. The overlap area shall be free of air.

Installation of heat insulation on base of polyurethane foam - shells

Wind the tapes with pre-heating of adhesion layer

Shrink the pipe-wound tape in one turn.

Change roll of heat-shrinkage tape

Appearance of prepared structure

## INSTRUCTIONS FOR INSULATION OF JOINTS

for pipelines out of pre-insulated pipes in the polyethylene sheath with polyurethane foam - shells complete with "THERMA-ST" tapes and "THERMA-LKA" locking plates

### 1. General information

- 1.1. Heat-shrinkage tape "Therma-ST" is designed for anticorrosion protection of welded joints of pipes with polyurethane foam insulation at heat, gas, water and oil pipelines.
- 1.2. Heat-shrinkage tape "Therma-ST" has 2 layers: radiation cross-linked polyethylene and thermoplastic adhesive. The tape comes in rolls or as sections per one joint. The locking plate "Therma-LKA" comes complete with the tape and is designed to glue the tape in the overlap spot.

### 2. Coating application equipment

"Therma-ST" coating can be applied only by the trained workers. The following equipment is required to prepare the surface for tape application:

- gas burner – 1 ea;
- propane bottle with c/w reducer - 1 ea;
- 10 m connecting gas hose – 1 ea;
- contact thermometer with measuring range 0 thru 150 °C;
- rubbing-down rollers;
- heat-resistant gloves, mittens, safety helmets, glasses;
- grinder, file, emery paper.

### 3. Surface treatment technique for the coating application

#### 3.1. Treatment of the factory coating.

To ensure proper shrinkage of polymer coating, smooth the sharp edges of the factory insulation. It is recommended to skew the edges with grinder or file under at least 30° to the pipe axis. Wipe the original factory insulation with dry clean rags. If there are any grease or oil spots on the factory insulation, remove them using rags dampened in acetone or white-spirit.

#### 3.2. Installation of polyurethane foam (PUF) shells

Install PUF shells onto the pipe and safety secure them. Cut off the sharp edges of PUF shells with a sharp knife.

#### 3.3. Heating the surface for insulation

Heat the edges of polyethylene sheath to  $100\pm 5$  °C, not setting polyurethane foam shell on fire. The heated surface shall be free of soot, which is reached by means of burner adjustment.

### 4. Installation of heat-shrinkage tape

#### 4.1. Preparing "Therma-ST" tape.

Across the tape width cut off 2 angles 50 mm edgewise and 15 mm lengthwise. If tape comes in a roll, then cut the needed dimensions in accordance with recommendations.

#### 4.2. Installing "Therma-ST" tape onto the pipe.

Wrap the tape around the pipe with polyethylene coating up (the tape overlap shall be at least 50 mm and placed on the side of pipe; tape end with cut angles will be located under the overlap; tape width shall cover the factory coating from both ends from the welded joints by at least 75 mm).

Heat the internal tape layer with the burner flame in the overlap spot (do not allow the polyethylene overheating and shrinking) and press the tape using the roller or heat-resistant gloves.

#### 4.3. Installation of locking plate "Therma-LKA".

Install the locking plate onto the overlap of the heat-shrinkage tape "Therma-ST" with polyethylene layer up so that the middle of "Therma-ST" tape overlap comes in-between under the locking plate. Prior to installation of the locking plate "Therma-LKA", pre-heat its low-melting layer under polyethylene. Then, place the plate on the overlap and heat it with yellow burner flame until the overlap contours appear. Then, compact the locking plate with roller or heat-resistant gloves. The indicator of proper locking plate installation is the bleeding of adhesive hotmelt from under edges of plate (along the perimeter).

#### 4.4. Thermal shrinking of the resulted structure.

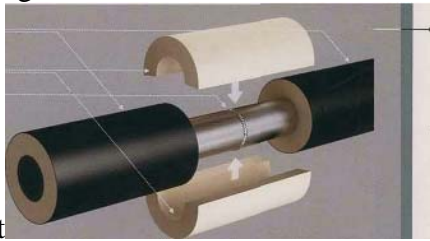
Start shrinking the cup after installing the locking tape "Therma-LKA". Shrinkage is performed using the gas burner flame. The burner flame shall be yellow and oriented in perpendicular to the pipe surface. Shrink from the cup center first one way, then other way. Shrink the tape by moving the burners along the pipe diameter not overheating the locking plate "Therma-LKA". If any air bubbles or crimps form under the cup, additionally heat them and smooth with heat-resistant rubbing-down roller or heat-resistant gloves.

### 5. Requirements for the joint insulation

- The resulted cup shall tightly cover the insulated surface of PUF shells and edges of factory pipe coating. Cup surface shall be free of bubbles, crimps, folds, or traces of polyethylene burn.
- The profile of "Therma-ST" tape overlap shall show through the locking plate "Therma-LKA".
- Adhesive will appear from both ends of joint, on the factory coating. The adhesive shall exude by several millimeters from the under "Therma-ST" tape edge along entire pipe diameter.
- When the installation is over, "Therma-ST" tape shall cover the factory coating by minimum 50 mm from both side of joint.

Pre-insulated pipes in polyethylene sheath

Heat insulating shells



Welded joint

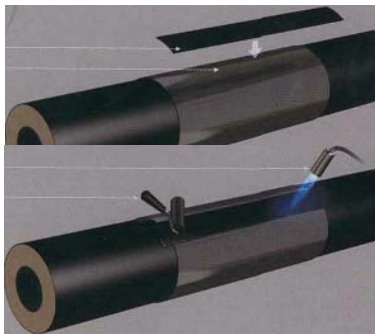
Installation of heat insulation of welded joint on base of polyurethane foam - shells

Install “Therma-ST” cup.

Ensure the tape overlap onto the edges of pipe polyethylene sheaths.



“Therma-ST” tape



Loop the cup into a ring, install the locking plate “Therma-LKA”

Compact the locking plate “Therma-LKA”.

Locking plate “Therma-LKA”  
Tape “Therma-ST”

Appearance of prepared structure

## INSTRUCTIONS FOR THERMAL INSULATION AND FLASHING OF JOINTS FOR PIPELINES

Out of pre-insulated pipes in the polyethylene sheath with heat-shrinkage couplings, with “THERMA-RZ” adhesive and “THERMA-ST” tapes

### 1. General information

These instructions regulate the activities on heat insulation and flashing (damp-proofing) of linear pipelines joints mounted out of the p-reinsulated pipes with heat insulation out of polyurethane foam and high-density polyethylene damp-proofing sheath (jacket) (pipes and shaped objects as per GOST 30732-2001) with heat-shrinkage couplings TU 5772-005-27519262-2000 by means of flowing and is the practical guidance for workers and engineers on pipeline installation.

### 2. Terms and definitions

This document uses terms and definitions in accordance with ISO 9001-96.

### 3. Materials used

- heat-shrinkage coupling in the protective packaging;
- heat-shrinkage tape "Therma-ST";
- adhesive tape “Therma-RZ”;
- drain plugs;
- high density polyethylene plugs;
- polyurethane foam system out of “A” and “B” components in the tanks.

Such materials as: heat-shrinkage couplings, components of PUF system, used in accordance with the project design, shall come with manufacturers’ certificates originals or copies authenticated by the certificate owner. The packaging film of the couplings shall distinctly show the marking with name of product, specification (TU) number, manufacturing date. Components of PUF system, delivered in sealed closed tanks, shall come with labels indicating the name (“A” or “B”), manufacturer classifier name, mix ratios, specification number, manufacturing date.

### 4. Application equipment

- Propane bottle with reducers and hose;
- Propane burner with special nozzle that provides the wide flame cone;
- cutting knife;
- cord brush;
- Tape-measure;
- chisel;
- Rasp;
- Flat-nose pliers;
- crimping tool;
- Marker;
- pulverizer with soap solution tank;
- plug welding fixture;
- 0.2 mm bore bit;
- Drill with mixing nozzle;
- Emery paper with grain 60-80;
- Acetone based solvent;
- Rags;
- tightening belts for coupling sizes over 400 mm.

For signal system installation: side-cutting pliers, press-tongs, conductor racks, solder gun, megger.

## 5. Making ready

Install coupling onto the pipe prior welding the abutment joint of metal pipes at the heating main. Do not remove the film until the joint insulation begins! The coupling marking shall correspond to the jacket diameter of the insulated pipeline. Insulation-free ends of steel pipes at the place of joint shall be amounting to:

- not more than 300 mm for pipes Ø 57-273 mm along steel section;
- not more than 500 mm for pipes Ø over 273 mm along steel section;

## 6. Operating conditions

Start the joints insulation only after the technical inspection of welded joints of steel pipes.

6.1. Perform activities under air temperature not less than -10 °C or if having the access pits minimum 1.4 m (0.7 m each way from the joint) and 400 mm deep.

6.2. In the course of precipitation perform activities only under the temporary shelter excluding the ingress of moisture onto the installed elements.

6.3. If the installed heating main is equipped with the operational remote control (ORC) system for the insulation condition monitoring, then immediately prior to the work on joint insulation you should connect the signal conductors and make appropriate measurements (insulation resistance and conductor continuity).

7.1. Clean the joints area from dirt, dust and moisture. Clean the polyethylene sheath for the distance, sufficient for the coupling travel along the clean surface, but not less than the length of coupling used. Clean the steel pipe with the cord brush until the metallic appearance.

7.2. From the pipe ends remove the heat insulating layer by 15-20 mm deep. (If the heat insulation on pipe ends becomes wet, then remove entire wet polyurethane foam.)

7.3. PUF jacket, from both sides of joints, by distance of 15-200 mm, degrease with solvent, thoroughly with emery paper and again treat with solvent.

7.4. Using the tape-measure, align the coupling position against the joint axis, put index lines with marker to match the expected coupling ends. With that, the earlier prepared jacket surfaces shall go outside the coupling dimensions by 20-50 from both sides. Do not use the chalk for marking!

7.5. Heat the prepared jacket surfaces from both sides from joints with soft flame of propane burner till 120 °C. Apply "Therma-RZ" adhesive tape onto the warm jacket surface along the perimeter, 5-10 mm overlap on index lines, 10-30 mm adhesive overlap in junction.

7.6. Unpack the coupling so that the outside surface of the packaging film is on the polyethylene sheath of pipe, but beyond the area of earlier prepared surfaces.

<p>Heat-shrinking coupling</p> <p>Cord brush</p> <p>Weld</p> <p>Pre-insulated pipes in polyethylene sheath</p>		<p>Mechanical treatment of welded joint surface subject to insulation application</p>
<p>Heat-shrinkage coupling</p> <p>“Therma-RZ” tape</p>		<p>Install the heat-shrinkage coupling on the weld area, heat the coupling edges</p>
<p>Propane burner</p> <p>Heat-shrinking coupling</p>		<p>Heat edges of PUF pipe jackets and apply hot-melt adhesive tape “Tehrma-RZ” (in effort of their thermal shrinkage and glueing to the edges of PUF pipe jackets using "Therma-RZ" tape hotmelt.</p>
<p>Heat-shrinking coupling</p> <p>Retaining belts</p>		<p>Coupling appearance, when the shrinkage is over</p>
		<p>Install retaining belts onto the edges of shrunk coupling for the entire cooling period (for couplings of Ø 400 mm and more)</p>

Of jackets, and coupling travel occurs along the clean internal surface of packaging.

7.7. After the adhesive cools off, slide the coupling onto the joint, placing it in accordance with earlier applied index lines. The internal coupling surface shall be dry and clean. If not following this condition, you shall degrease, skive with emery paper and degrease again the coupling shrinkage areas by 150 mm from both coupling ends. Do not allow entry on dust, moisture and dirt onto the surface of adhesive tape.

7.8. Coupling bigger than 400 mm shall be aligned using the wedges, trying to reach the equal distances between polyethylene sheath and coupling on the top and bottom cuts-off.

7.9. Bore two 0.20 mm holes 150 mm away from the coupling ends on the top. If coupling  $\varnothing < 315$  mm, bore one hole in the middle.

7.10. Shrink the coupling edges. To do so and not to damage the coupling, heat with soft (yellow) burner flame by circular continuous movements uniformly around the coupling circle. Heat until the surface of the coupling edge becomes soft to the touch (check the hardness of the coupling edge surface using gloves). When the heated coupling edge softens enough, it is necessary to cease heating and start shrinking the next edge of coupling (do not allow shrinking with spots and overheat (polyethylene luster) of coupling and jacket). Thus, moving from one coupling edge to another, gradually achieve full shrinkage.

7.11. If shrinking the coupling with  $\varnothing > 400$  mm, remove the wedges once the clearance between coupling and polyethylene sheath decreases to 5-7 mm in the bottom part. Once the wedges are removed, resume heating of the coupling. When shrinkage is over, the coupling edges will assume the sheath form, and adhesive will exude from under. If shrinking the coupling with wall thickness over 7 mm, it is necessary to additionally heat the shrinkage areas for 15 minutes (maintaining 120 °C). In doing so, control the firm surface contact, free of deformation and scuffing at the coupling edges.

7.12. When the coupling cools off to 60 °C, re-heat.

7.13. For couplings with diameter of 400 mm and more, the shrinkage is followed with strapping of the coupling edge with retaining belts at least 50 mm wide, in doing so, the coupling temperature shall not be less than 110 °C. When coupling and polyethylene sheath cool down to +40°C, remove the belts.

7.14. After removing the belts, the coupling edges are fitted with the heat-shrinkage coupling "Therma-ST" 225 mm wide along with the locking plates "Therma-LKA". After shrinkage the coupling assumes the barrel-like shape.

#### 8. Leakage test

The tightness is checked by means of pressure test, when the coupling cools down to 40 °C. Insert a special pressure test tool into the bores drilled as per step 7.9, and inject air into coupling under 0.3 bar of pressure. Keep the coupling under the testing pressure for 5 minutes. In event of pressure drop, use the pulverizer and spray the soap solution along the perimeter of coupling-sheath joints. The defects can be noticed by the bubbles of soap solution. The identified defect areas shall be re-heated with soft flame of propane burner and re-tested. If the joints pass the re-testing, remove the testing tool out from the holes.

#### 9. Heat insulations of joints

9.1. Batch in the clean tank the required amount of "A" & "B" components adequate for the filling volume of joint (proportions to honor the operating procedures of Vendors).

Mix the components with the drill fitted with a special mixing nozzle. Pour the mix of PUF components into the joint via the holes. Close the holes with drainage plugs.

9.2. In the course of foaming, little amount of foam will bleed out via the plug drain, this will be an indication about the full filling of the joint volume.

9.3. When the foam hardens, remove the drain plugs, clean the coupling surface adjacent to the filling holes from the foam surplus and treat holes with the coned cutter or other cutting tool.

**Attention:** "B" component is of 2<sup>nd</sup> hazard class, has general toxic effect and causes the irritation of upper respiratory tracts. When working, exclude the entry of components onto the exposed body areas. When filling, stay outside the area of potential foam splashing. When working inside, provide force ventilation in work area.

9.4. Weld (seal) the holes with polyethylene plugs. To do it, heat the plug welding tool to not higher than 240°C (polyethylene shall not be smoking). Insert the polyethylene plug into the inside tool cone, insert outside cone into the filling hole, and press onto the polyethylene plug to slide the tool into the coupling hole. When the plug deepens into cone by 2 mm, pull out the tool and press the melted plug into the coupling hole. Hold plug under pressure for 20 seconds.

9.5. In order to level the coupling surface, treat the plugs with the cutting tool after cooling.

#### 10. Safety measures

10.1. Heat insulation and flashing (damp-proofing) of joints can be done only by persons who read these instructions and passed appropriate tests, received training, briefing and underwent competency assurance check on the safe working practices, have access for servicing of gas bottles and using the electric hand tools of electrosafety group minimum 2.

10.2. All installation activities shall be conducted in accordance with safety requirements as per SNiP 12-03-99 "Construction Labor Safety", "Preventive fire-fighting regulations", "Gas service safety regulations".

10.3. Prior to the installation, clean the work place from the combustible materials. Use the safety screens to protect structures made of combustible materials. Equip the job site the fire-extinguishing means.

10.4. Tools and fixtures used to perform the work shall be in working order and inspected minimum one time per 10 days and immediately prior to usage. It is prohibited to use bad tools not in compliance with safety requirements.

10.5. Perform all polyurethane foam filling activities using overalls and personal protective equipment, including rubber gloves, gas mask БКФ or respirator PY-60.

10.6. If poisoned with the vapors of isocyanate or products of its combustion, you should take the victim out of the hazardous zone and deliver him to the medical facility to administer the qualified medical assistance.

10.7. Near the work area always have the decontamination equipment for the chemicals used (5-10% aqua ammonia, 5% spirit of salt), as well as first-aid kit with necessary medications, which additionally shall contain 1.3% salt brine, 5% solution of boric acid, ethyl alcohol, 2% solution of cooking soda.

- 10.8. In event of polyisocyanate spill immediately cover it with dry sand or sawdust, neutralize with 5-10% aqua ammonia (soak for at least 2 hours), then collect and bury in the ground. It is prohibited to burn sawdust containing the polyisocyanate.
- 10.9. In case of skin contact of polyisocyanate (component "B"), immediately wipe the affected area with swab dampened with ethyl alcohol and vigorously flush with water. If large area of skin is affected, take warm shower with soap and address to the medical facility.
- 10.10. In case of skin contact of polyol (component "A"), vigorously flush the affected area with warm water and soap.
- 10.11. In case of eye contact of polyisocyanate (component "B"), immediately wash eyes with 1.3 % of cooking soda, then flush with clean water and address to the medical facility.
- 10.12. In case of eye contact of polyol (component "A"), immediately wash eyes with 1.3 solution of cooking soda, then flush with plenty of clean water.

- 10.13. If polyisocyanate (component "B") gets into mouth, vigorously rinse mouth with water and address to the medical facility.
- 10.14. In case of clothes contamination with polyisocyanate (component "B"), take clothes off, remove them from the room and decontaminate and clean the affected areas. Decontaminate with 5% of aqua ammonia (soak for 24 hours), then launder in a soap water and rinse and clean water.
- 10.15. In case of clothes contamination with polyol (component "A"), take clothes off and launder them using detergents.
- 10.16. The polyurethane foam production waste shall be disposed of by means of burying them in the ground at the landfill at depth of 2 m. Large plastic foam pieces shall be preliminarily shredded.

Heat-shrinkage tape "Therma-ST" 225 mm wide



Installing additional damp-proof cups "Tehrma-ST" on the edges of shrunk coupling

Coupling edges shall go under the middle of "Therma-ST" tape.

Installing the locking plates "Therma-LKA" on the overlaps of edges of "Therma-ST" tape

To ensure the tight locking of tape into a ring and prevent its unlocking during the thermal shrinkage

Heat-shrunk coupling  
Locking plates "Therma-LKA"  
Tape "Therma-ST"



Shrinking the cup comprising of "Therma-ST" tape and locking plates "Therma-LKA"

Appearance of prepared structure

## INSTRUCTIONS FOR INSULATION OF JOINTS

with heat-shrinkage “THERMA-STMP” cups c/w epoxy primer

### 1. General information

1.1. The polymer coating “Therma-STMP” is the package that is comprised of the heat-shrinkage tape with applied hot-melt adhesion layer (designed for anticorrosion protection of welded joints of pipes), locking plate “Therma-LKA” (designed to loop the tape into a ring around the pipe at weld area) and two-component epoxy primer. During installation, heat-shrinkage cup is applied over the epoxy primer.

1.2. Epoxy primer consists of two components: component “A” (Epoxy resin. Packed into plastic can), component “B” (Hardener. Packed into tube), which are intermixed till the uniform mass prior to application onto pipe. The primer components are supplied on the basis of one tank of component “A” and one tank of component “B” per one welded joint. The standard packaging of a primer is good for one joint 300 mm wide and application by foamed rubber roller.

1.3. If the construction activities are performed with the surrounding temperatures below +5 °C, it is necessary to thermally condition the insulating materials, including the primer components, under 20-25 °C.

### 2. Coating application equipment

“Therma-STMP” cups can be applied only by the trained workers. The following equipment is required to apply Therma-STMP:

- gas burner – 2 ea;
- propane bottle with reducer – 2 ea;
- 10 m connecting gas hose – 2 ea;
- contact thermometer with measuring range 0 thru 150 °C;
- silicon heat-resistant rubbing-down rollers;
- heat-resistant gloves, mittens;
- spatula to mix the primer components;
- foamed rubber rollers to apply the primer onto the insulated surface of the welded joint

### 3. Surface treatment technique prior to the coating application

**3.1.** Preparatory mechanical treatment of the pipe steel surface. Using grinder or file, remove burrs and sharp fins from the pipe steel surface.

**3.2.** Final cleaning of the pipe steel surface. Using sandblast unit, treat the pipe surface to the 2<sup>nd</sup> cleaning degree (at least) as per GOST 9.402-80. When the treatment is over, the pipe shall be of light-grey color and free of rust and scale. For pipe sizes up to 325 mm, it is allowed to use the grinder to the surface treatment, provided thorough control over the cleaning degree. The steel surface of the welded joint shall be grease free (in case there are grease spots, wipe them out with rags dampened with white-spirit or other solvent) and dust free (dust shall be removed with dry clean rags).

**3.3.** Treatment of the factory coating. To ensure proper shrinkage of polymer coating, smooth the sharp edges of the factory insulation. The edges of polyethylene base insulation within 100 mm from the brim (from both sides of the welded joint) shall be grease free (in case there are grease spots on the pipe, wipe them out with rags dampened with white-spirit or other solvent) and dust free (dust shall be removed with dry clean rags; and have roughness (the required roughness is achieved with sandblasting).

### 4. Preparing the primer blend

4.1. Heat on water bath the tanks with components “A” and “B” to 35±5 °C (higher temperatures shorten the life of primer).

4.2. Vigorously force out component “B” from the tube into the plastic container with component “A”.

4.3. Agitate components “A” and “B” with spatula until the uniform mixture.

### 5. Heating the surface for insulation

With sootless flame of burner, heat the surface to the temperature of (40-60) °C. The surface shall be free of soot, which is reached by means of burner adjustment.

### 6. Primer application

6.1. Unload the ready mix from the tank onto the piece of steel pipe and using foamed rubber roller apply it by even layer 100-200 microns thick onto the steel surface, pre-heated to 40-60 °C (See step 5). The mix shall be unloaded onto the pipe within 5 minutes once it's ready.

**6.2.** Heat the primer on the pipe with soft flame of gas burner until it completely solidifies under 110 ± 5 °C, not allowing its overheating or ample gas liberation. In doing so, also heat the factory coating from both sides from the weld by 75-100 mm to the temperature of 90 – 110 °C. Check the primer solidification degree to aftertack (primer shall not stick or soil). It is PROHIBITED to discard the used tube and mixing tanks on job site. Dispose of in accordance with existing regulations on industrial waste utilization.

**6.3.** Install “Therma-STMP” cup in accordance with the application instructions. The temperature of the primed steel surface after the complete solidification shall stay within 110 ±5 °C and shall not decrease during the cup installation.

### 7. Installation of heat-shrinkage cup

#### 7.1. Preparing the tape

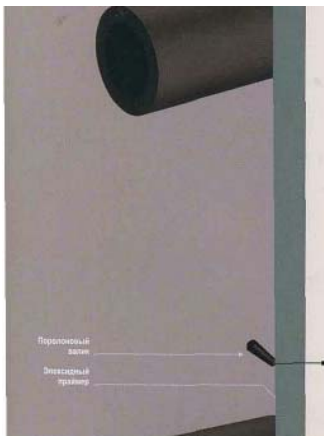
Across the tape width cut off 2 angles 50 mm edgewise and 15 mm lengthwise (so that the cup edge is trapezoid). If tape comes in a roll, then cut the needed dimensions in accordance with recommendations.



Sand blast unit  
Welded joint  
Pipe in factory base polyethylene insulation

Mechanical sandblasting treatment of welded joint surface subject to insulation application

Heating the steel surface for insulation, and heating the edges of factory polyethylene insulation by 10-15 cm from the weld area



Applying the epoxy primer onto the steel surface using the foamed rubber roller

Propane burner  
Weld

Foamed rubber roller  
Epoxy primer

## 7.2. Installing cup onto the pipe

Wrap the cup around the pipe with polyethylene coating up (tape overlap shall be minimum 100 mm and placed above and sideways of pipe at 2 or 10 o'clock). Place the tape side with cut angles under the overlap; tape width shall cover the factory coating from both sides from the weld by minimum 75 mm. Heat the inside adhesion layer at the cup edge at the overlap area with the burner flame (do not allow overheating and shrinking of polyethylene) and press the cup edge using the roller or heat-resistant gloves.

## 7.3. Installation of locking plate "Therma-LKA".

The locking plate is placed at overlap spot of heat-shrinkage cup with polyethylene layer up, and the middle of overlap shall pass in-between the locking tape. Prior to installation of the locking plate "Therma-LKA", pre-heat its internal adhesion layer under polyethylene. Then, place the locking plate at the overlap and heat it with yellow burner flame and at the same time compact it using the rubbing-down silicon roller until the overlap contours appear and glue bleeds along the edges of locking plate (hotmelt of adhesion layer at the locking plate). Then perform the final compaction of the locking plate with the roller or heat-resistant gloves to remove bubbles and crimps.

## 7.4. Thermal shrinkage of the cup

Heat shrinking shall be started after the installation of the locking plate. Shrinkage is performed using the soft flame of gas burner. Shrink the cup from the weld line one way, then from the weld line other way. Shrink the cup by moving the burners along the pipe diameter not heating the locking tape. In case of formation of any bubbles or crimps, smooth them using the rubbing-down heat-resistant roller or heat-resistant gloves.

## 8. Requirements for the joint insulation quality

**8.1.** The following regulatory requirements shall be honored on quality control activities:

- SNiP 111-42-80 "Regulations for execution and acceptance of work. Main pipelines";
- SNiP 3.01.01-85 "Construction operations management";
- VSN 008-88 Construction of main and field pipelines. Anticorrosion and heat insulation";
- GOST R 51164-98 Technical specifications for materials in use.

**8.2.** Materials used to insulate the joints, shall have the technical data sheets that will control their compliance with the regulatory requirements.


**8.3.** The following continuous visual quality control is required while applying the heat-shrinkage cup "Therma-STMP" onto the welded joint: treatment of the pipe surface for insulation, application of primer, application of insulation coating. Visually inspect the prepared coating in effort of its condition check. With that the created coating shall meet the following requirements:

- a) The heat-shrinkage cup shall tightly cover the insulated surface of metal and factory coating of pipe and have the surface, which is free of bubbles, crimps, folds or traces of polyethylene burn.
- b) The profiles of pipe welded joint and cup overlap shall show through the insulation.
- c) Adhesive will appear from both ends of joint, on the factory coating. Adhesive shall exude the cup edge throughout the pipe diameter.
- d) Tape shall cover the original factory coating by minimum

by 50 mm from both weld sides, e) the coating integrity shall be tested with defectoscope (NDI instrument) with voltage of 5 kV per 1 mm of thickness.

In the course of insulation of joints and laying the pipeline honor the requirements of the following documents:

- SNiP 1114-80 "Construction Safety";
- RD 102-011-89 "Occupational safety. Administrative and methodical documents". Safety regulations in construction of main steel pipelines;
- GOST 12.3.016-87. SSBT. "Construction. Anticorrosion operations. Safety requirements". Regulations for arrangement and safe operation of the lifting cranes.

<p>“Therma-STMP” cup</p>		<p>Install “Therma-STMP” cup. Ensure the cap overlap on the edges of factory base polyethylene insulation.</p>
<p>“Therma-STMP” cup Locking plate “Therma-LKA”</p>		<p>Loop “Therma-STMP” cup into a ring by means of installation of the locking plate “Therma-LKA”</p>
<p>Propane burner “Therma-STMP” cup</p>		<p>Thermal shrinkage of “Therma-STMP” cup.</p>
		<p>Appearance of prepared structure</p>

## INSTRUCTIONS FOR INSULATION AND REPAIR OF PIPELINES with “THERMA-L” tapes by means of lap-winding process

### 1. General information

Therma-L tape is designed to be used as the protective wrap in the coating structures on the basis of the bitumen-polymer mastics.

2. The temperature of bitumen-polymer coating of the pipe prior to application of Therma-L tape shall not be lower than 70 °C.

### 3. Winding the tape onto the pipe

- Apply the roll end to the pipe, providing the required winding angle, then fix it;
- Apply the tape onto the pipe with overlap and tightness, providing the shrinkage effect and firm adherence of tape to the bitumen coating;
- Then repeat the application technique, adjusting the winding angle as appropriate.

### 4. Coating appearance

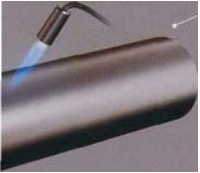
Uniform surface free of breaks, bubbles or folds.

Note: You can address to the manufacturer for the detailed operational procedures and application recommendation or read them on the company website under “Instructions for use”.

Mechanical treatment of surface  
subject to insulation application



Pre-heat the surface of pipe subject  
to insulation application



Woven scrim layer

Layer of heat-shrinkage tape "Therma-L"

Mastic

Apply the flux of bitumen-polymer  
mastic

Apply the woven scrim (as a  
reinforcing layer) and heat-shrinkage  
wrapping tape "Therma-L" on the  
mastic flux.

"Therma-L" wrapping tape is glued to  
the flux of bitumen-polymer mastic  
and shrunk, thus firmly pressing the  
pipe on account of the mastic  
temperature.



Appearance of prepared structure

Mechanical treatment of surface subject to insulation application

Pre-heat the surface of pipe subject to insulation application

If needed (if ambient temperature is lower than +10 °C), preheat the pipe surface to 15-40 °C.

Apply bitumen-polymer prime coat

Apply rolled reinforced material “RAM”, then apply over the wrapping tape “Therma-MH” polymer-bitumen adhesion layer

Appearance of prepared structure

## INSTRUCTIONS FOR PIPELINE WRAPPING with "THERMA-M" tapes by means of lap-winding process

### 1. Preparing the pipe surface

Prior to the coating application, clean the pipe surface manually or mechanically from the old coating, earth and rust to the 4<sup>th</sup> degree as per GOST 9.402-80. Do not allow any snow, ice or water drop on the surface.

### 2. Priming

Apply the prime coat onto the pipe surface manually using rollers, brushes, etc.

The prime coat layer shall be uniform throughout the pipe surface and be free of leaks, bubbles or gaps. The average prime coat consumption is 0.15-0.25 l/m<sup>2</sup>.

### 3. Winding the tape onto the pipe

- With negative ambient temperatures the insulating materials ("Therma-M" tape, prime coat and "Therma-LKA" locking plate) shall be held inside the warm (minimum 15 °C) room.

- The winding angle of "Therma-M" tape will be clarified by means of tentative winding without removal of the release film.

- Remove the release film from the end of "Therma-M" tape roll, apply the tape and rub it down with the roller. Wrap the roll with tape around the pipe by one turn with minimum 30 mm overlap.

- In advance remove the release film from the piece of tape, needed for 1 turn.

- Wind with the tape tension force of about 2 kg per 1 cm of width for exudation of the overlap zone and pushing out the air from under the tape. If impossible to manually provide the required tension (tape width is over 150 mm) - shrink the tape (wound on the pipe in 1 turn) using the burner flame, and in parallel, using the roller or heat-resistant gloves, remove the air from under the tape.

- Then repeat the technique, adjusting the winding angle as appropriate.

### 4. Roll change

- apply the end of wound roll to the pipe and compact it with heat-resistant roller;

- On the top apply the tail of new roll to the end of wound roll by 50-100 lengthwise and compact it with heat-resistant roller (slightly pre-heat the adhesive coat of new roll with the gas burner).

- Install the locking plate "Therma-LKA" at the tail of new roll. The locking plate is place at overlap spot with polyethylene layer up, and the middle of overlap shall pass in-between the locking tape. Prior to installation of the locking plate "Therma-LKA", pre-heat its internal adhesion layer under polyethylene. Then, place the locking plate at the overlap and heat it with yellow burner flame and at the same time compact it using the rubbing-down silicon roller until the overlap contours appear and glue bleeds along the edges of locking plate.

When the insulation of the needed section is over, cut a tape from the roll and rub it down to the pipe with the winding angle perpendicular to the pipe axis (so that the tape edge is laid not on the tubular, but on the tape itself of the last turn). Place the locking plate "Therma-LKA" on the edge of "Therma-M" tape.

The tape shall firmly cover the insulated surface and be free of bubbles, crimps, folds or traces of polyethylene burn. The adhesive shall exude along the edges of the installed tape throughout the pipe diameter.

Mechanical treatment of surface subject to insulation application

Pre-heat the surface of pipe subject to insulation application

If needed (if ambient temperature is lower than +10 °C), preheat the pipe surface to 15-40 °C.

Apply bitumen-polymer prime coat

Apply the “Therma-M” tape with bitumen-polymer self-adhesive layer

Appearance of prepared structure

## **List of terminology used**

**Adhesion layer** – sticky layer that ensures the adherence to the insulated surface. In case of using the lap-winding process, this layer also ensures the adherence of the tape to itself in the areas of turn-to-turn overlap.

**Cold application technique** – the method of insulated coating process that doesn't require pre-heating the surface for insulation.

**Cold application tapes** – tapes applied using the "cold technique".

**Hot application technique** – the method of insulated coating process that requires pre-heating the surface for insulation up to the high temperatures (normally 70-120 °C, depending on the type of insulating material).

**Hot application tapes** – tapes applied using the "hot technique".

**Shrinkage** – heating of the heat-shrinkage material (normally performed using the open flame of the gas burner or heat gun) that causes the reduction of its linear dimensions (tapes are featured with the significant shrinkage degree in the linear direction and insignificant shrinkage in the transversal direction). The value of the linear shrinkage is manufacturer specified. The value of transversal shrinkage for the described tape type ideally shall be equal to zero, in practice it doesn't exceed 3% out of width.

HEAT SHRINKAGE ANTICORROSION  
INSULATING MATERIALS

- insulation for main pipelines
- insulation for welded pipe joints
- materials for repairing of insulation
- damp-roofing for heating mains
- adhesives