EMBRACING THE CHANGE

TO

PRE-INSULATED PIPE SUPPORTS

WHAT ARE THEY? *WHY USE THEM?*

EXHIBITOR BOOTH 47

RILCO MANUFACTURING COMPANY

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PRE-INSULATED SUPPORTS

FOR

DISTRICT ENERGY APPLICATIONS

ABOVE GROUND PIPING FOR DISTRIBUTION
ABOVE GROUND PIPING IN PLANTS
PIPING IN TUNNELS
PIPING IN TRENCHES

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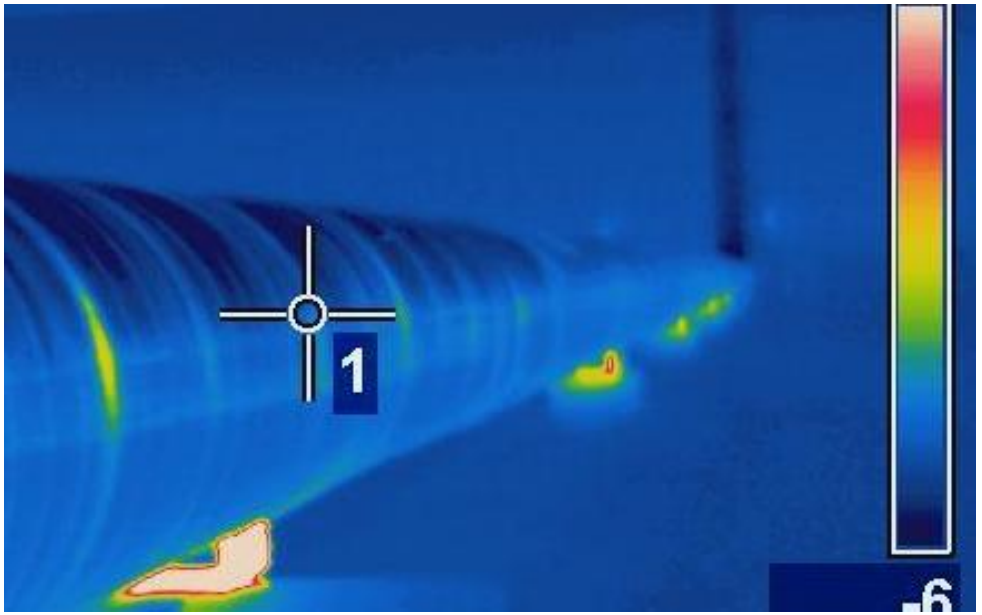
EFFICIENCY

Isn't this a core objective of IDEA and District Energy?

SUPPORTS THAT
WELD DIRECTLY TO PIPE
OR
CLAMP DIRECTLY TO PIPE

HAVE DOCUMENTED INEFFICIENCIES

WELDED SUPPORTS ON AN INSULATED LINE



PRE-INSULATED SUPPORTS ISOLATE THE PIPE FROM THE OUTSIDE STRUCTURE FOR MAXIMUM EFFICIENCY

PRE-INSULATED SUPPORTS OFFER AN IMMEDIATE THERMAL BREAK

ELIMINATES “RADIATOR FIN” HEAT LOSS THROUGH THE BASE

KEEPS BTU’S IN OR OUT OF THE PIPE DEPENDING ON TEMERATURE OF SERVICE

CASE #1: CALCULATION OF COMPARITIVE HEAT LOSS OF VARIOUS PIPE SUPPORT DESIGNS and OPERATING COSTS

As a baseline calculation, “ASTM C680-10 Standard Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs” is used to predict the surface temperature and heat loss of the insulation system. To evaluate the heat loss of the two pipe support designs, a CFD (computational fluid dynamics) program, Autodesk CFD 360-2015 calculation is utilized.

Using ASTM C680-10 calculations, We compared:

36” pipe with **100mm** of Mineral Wool, process temperature 296 °C. with a welded support that was insulated over the pipe and support

36” pipe with **40mm** of Pyrogel XT, process temperature 296 °C. using a pre-insulated pipe support

36” pipe with **50mm** of Pyrogel XT, process temperature 296 °C. using a pre-insulated pipe support

- All pipe lengths 1 meter
* Native insulation of each over the pipe was calculated for a baseline without supports

RESULTS OF PIPE SUPPORT COMPARISON

Table 3-Comparision of Heat Loss and Surface Temperature of Native Insulation, welded on support and Insulated Designs										
Pipe Size	Pipe OD (in)	Insulation Thk(mm)	Insul Type	Process Temp (deg C)	Surface Temp. Native Insulation per CFD (deg C)			Heat Loss Native Insulation CFD (W/m)	Heat Loss of Weld Design and Insulated Design with High Strength Inserts CFD (W/m)	% Diff.
36"	36	100	MW	296	1.34	WELDED SUPPORT		-589.8	-4107	596.3%
36"	36	40	PG	296	2.78	PRE-INSULATED SUPPORT		-605.6	-870.2	43.7%
36"	36	50	PG	296	-0.048	PRE-INSULATED SUPPORT		-478	-745.25	55.9%

PERCENT HEAT LOSS FROM NATIVE INSULATION NOTE WELDED SUPPORT SYSTEM

COST ANALYSIS

Assuming an energy cost of $6.00 per MMBTU,

Table 6 compares the net energy costs in utilizing weld on and insulated pipe support versus the same one meter section of pipe with the native insulation.

Table 7 extends the energy costs and savings assuming a system total of 200 support quantity.

ONE METER SUPPORT / PIPE SECTION

Table 6 -Calculation of Approximate Net Energy Costs between Native Insulation and Insulated Supports/ Weld on Supports

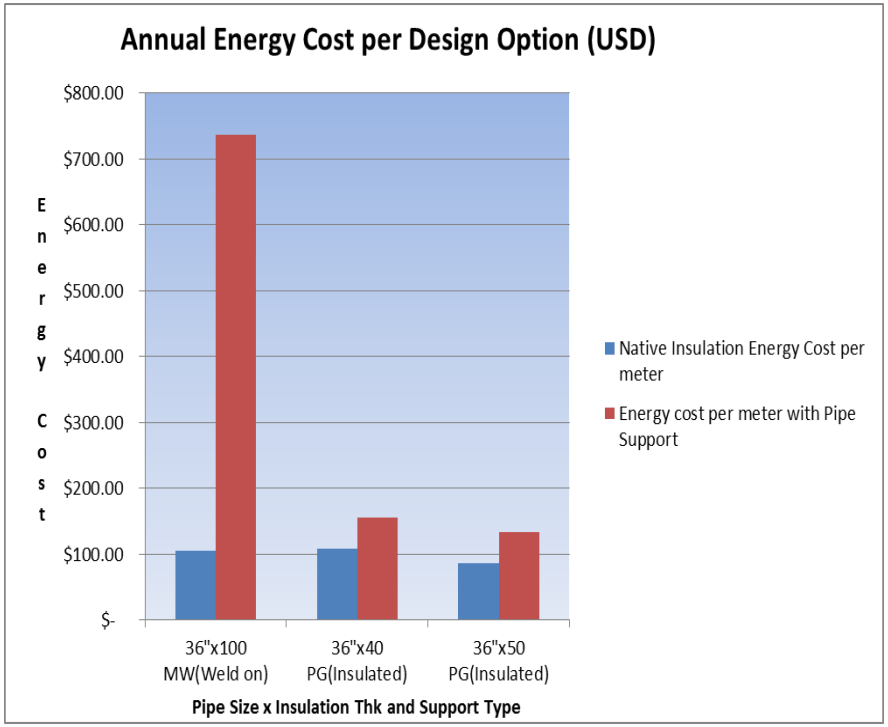
Pipe Size	Insulation Thk(mm)	Insul Type & Support Type	Native Insulation Energy Cost per year @ $6 MMBTU	Weld on and Insulated Support Cost @ $6/USD per MMBTU	% Increase over Native Insulation		Energy Cost increase at Support over Native Insulation	5 Year Energy Cost increase at Support over Native Insulation
36"	100	MW(Weld on)	$ 105.78	$ 736.56	596.3%		$ 630.78	$ 3,153.91
36"	40	PG(Insulated)	$ 108.61	$ 156.06	43.7%		$ 47.45	$ 237.27
36"	50	PG(Insulated)	$ 85.73	$ 133.65	55.9%		$ 47.93	$ 239.65

200 EACH SUPORTS AND ASSOCIATED PIPING

Table 7 -Calculation of Net Total System Energy Cost Savings Assuming a System Total of 200 Supports

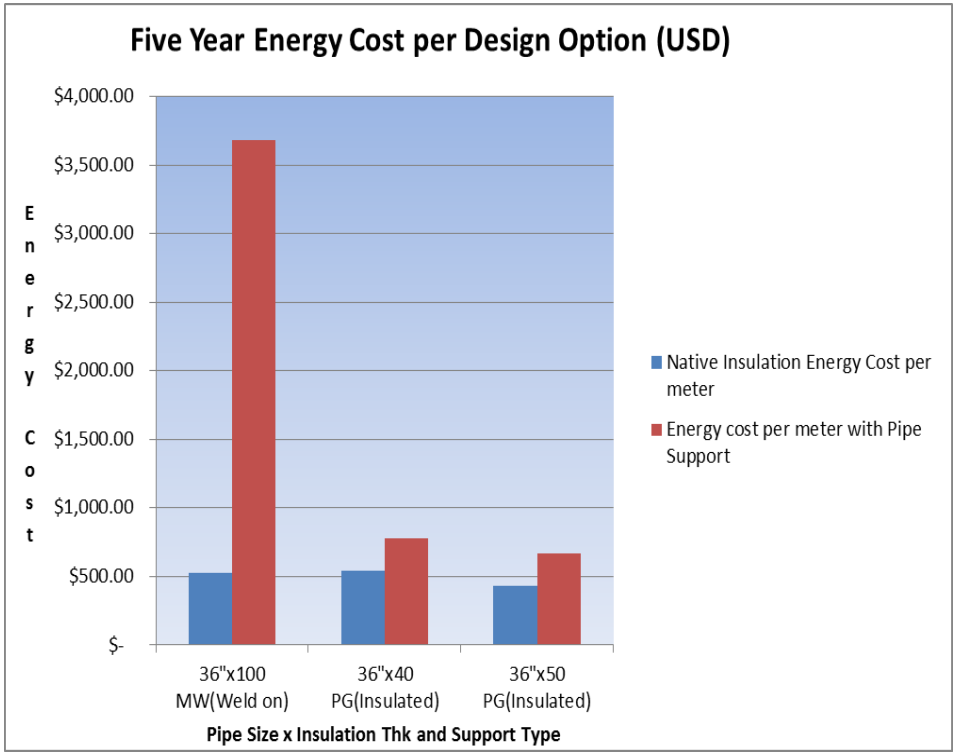
Pipe Size	Insulation Thk(mm)	Insul Type & Support Type	Annual Energy Cost increase at Support over Native Insulation for Single Support	Assumed Quantity of Supports in System	Annual Energy Cost increase at Support over Native Insulation for System	Annual Net Savings of Pipe Support Design versus Weld on Support	5 Year Energy Cost increase at Support over Native Insulation for System	5 Year Net Savings of Pipe Support Design versus Weld on Support
36"	100	MW(Weld on)	$ 630.78	200	$ 126,156.39	N/A	$ 630,781.96	N/A
36"	40	PG(Insulated)	$ 47.45	200	$ 9,490.78	$ 116,665.61	$ 47,453.91	$ 583,328.04
36"	50	PG(Insulated)	$ 47.93	200	$ 9,585.83	$ 116,570.56	$ 47,929.17	$ 582,852.79

VISUAL REPRESENTATION OF COST COMPARISON



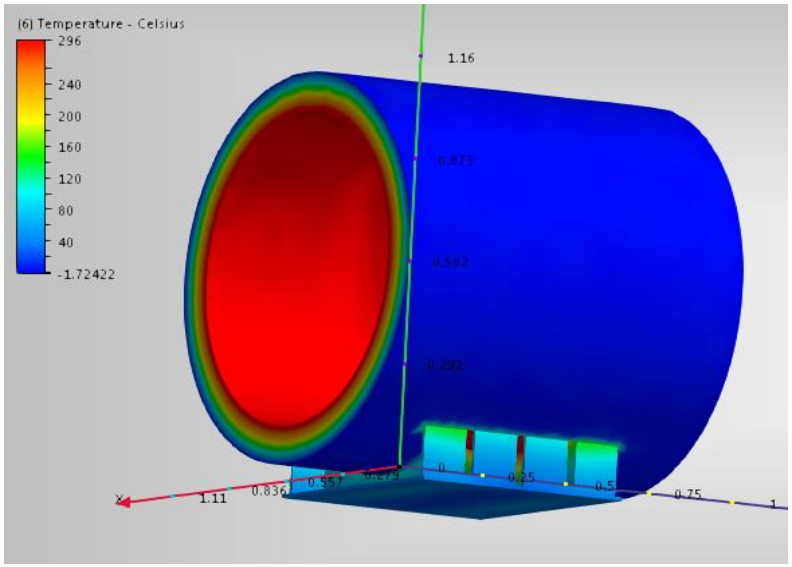
GRAPHS SHOW ONE SUPPORT ON ONE METER OF PIPE.

EXTRAPOLATE TO YOUR PROJECT SIZE

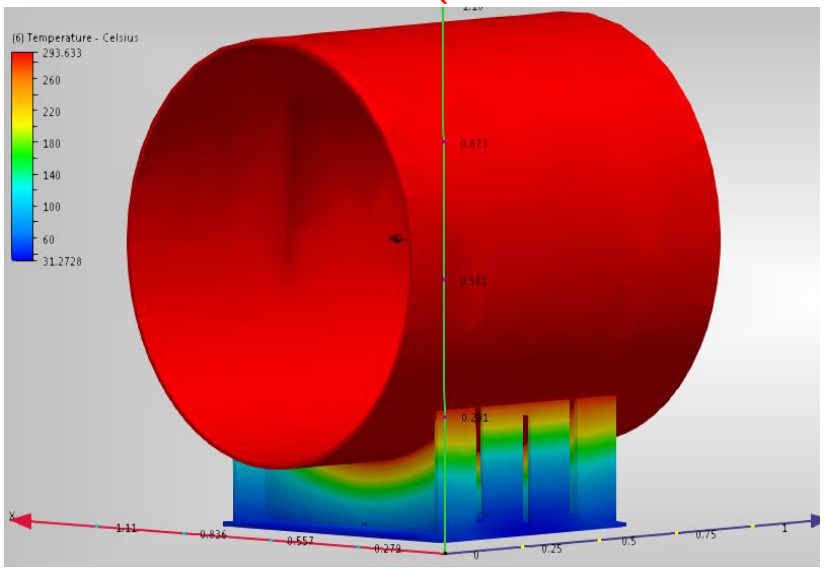


COMPUTER MODELING OF HEAT LOSS

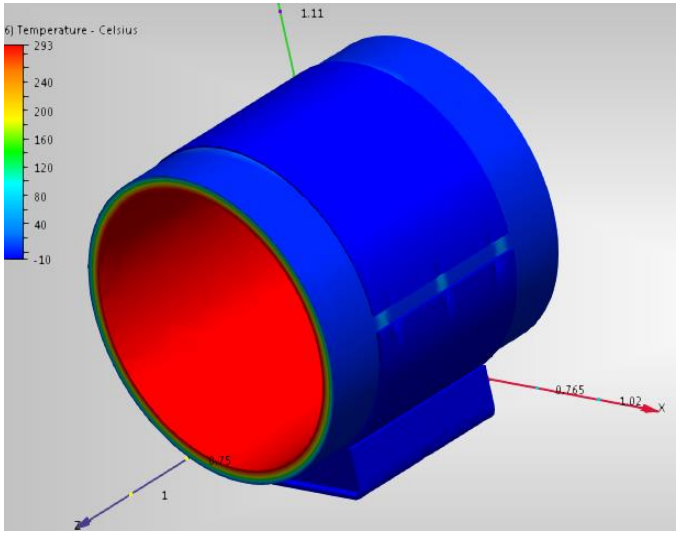
WELDED SUPPORT



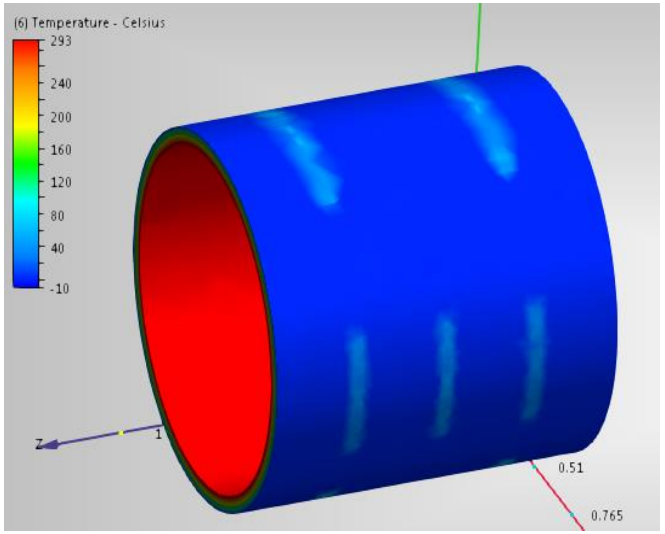
WELDED SUPPORT (INSULATION HIDDEN)



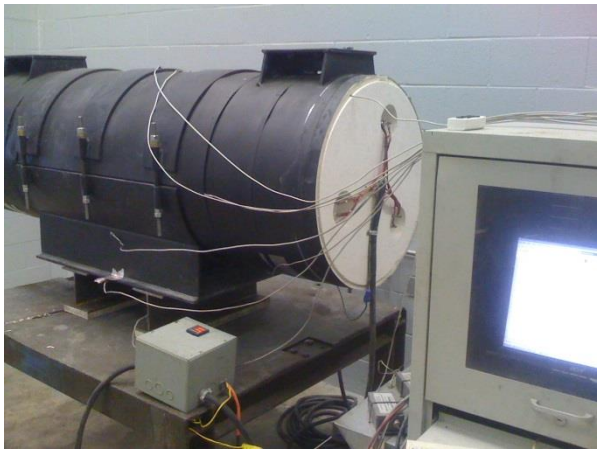
PRE-INSULATED SUPPORT



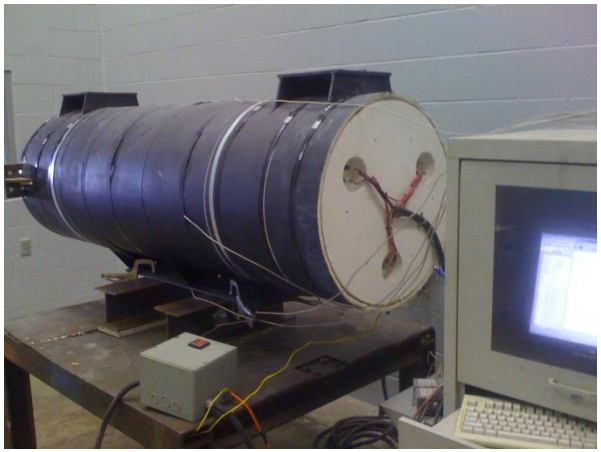
PRE-INSULATED SUPPORT (STEEL HIDDEN)



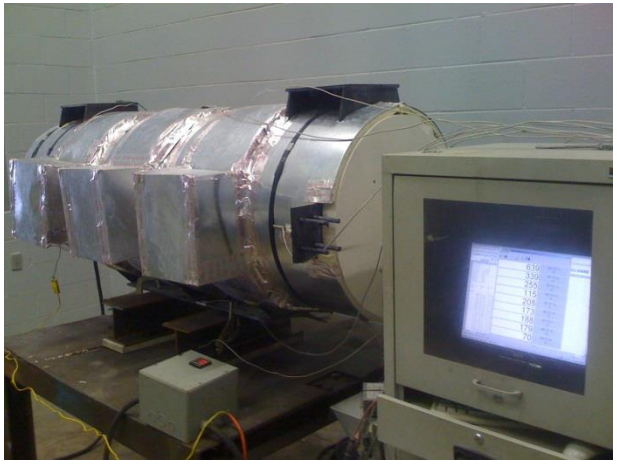
CASE #2: THERMAL LOSS TEST COMPARISON OF 3 TYPES OF PIPE SUPPORTS



PRE-INSULATED SUPPORT



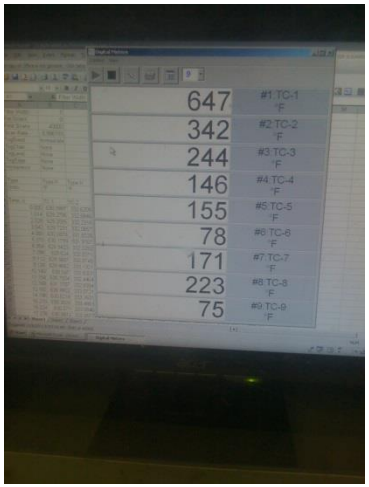
WELD-ON SHOE



CLAMP-ON SHOE

<u>NOTE</u>: Testing was performed in a shop environment at approximately 75-80 degrees F (24 degrees C). The test was performed in a calm environment with <u>NO WIND</u>. WIND across the system, and especially the WELDED support will significantly affect the heat loss and energy usage.

WATT METER



THERMAL LOGGING

THERMALLY TESTED PIPE SUPPORTS

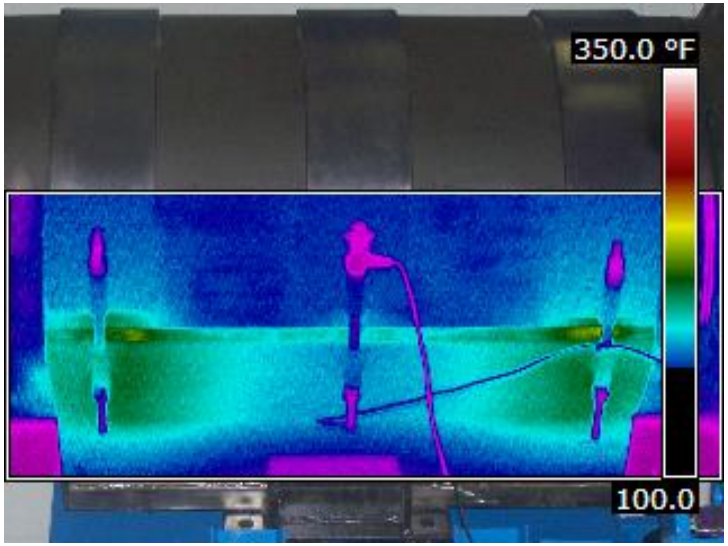
INFRARED PHOTOGRAPHY OF HEAT LOSS

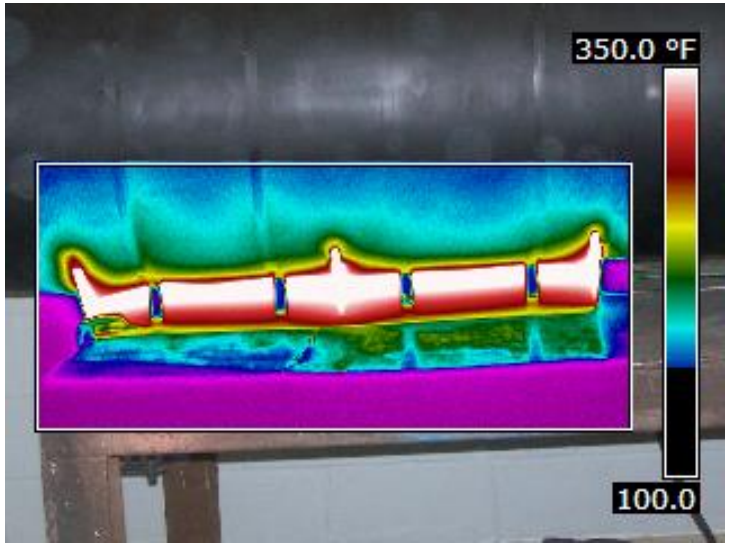
PRE-INSULATED SUPPORT

WELD-ON SUPPORT

24” STEAM LINE SUPPORTS

343 Degree C
(650 Degree F)

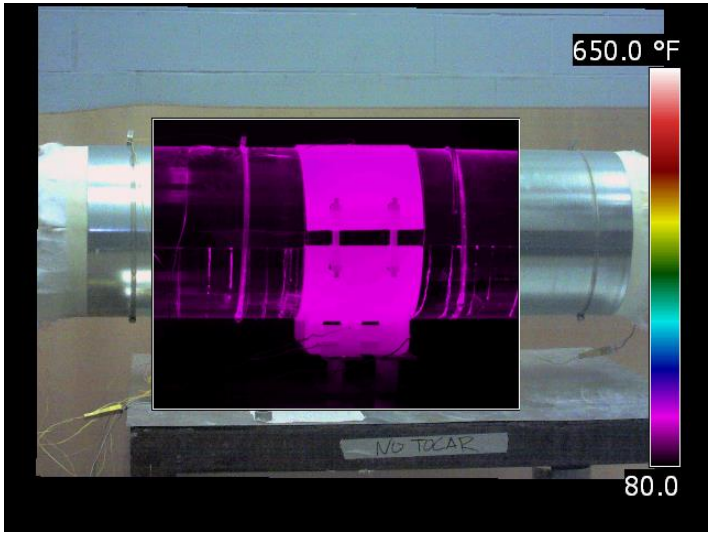


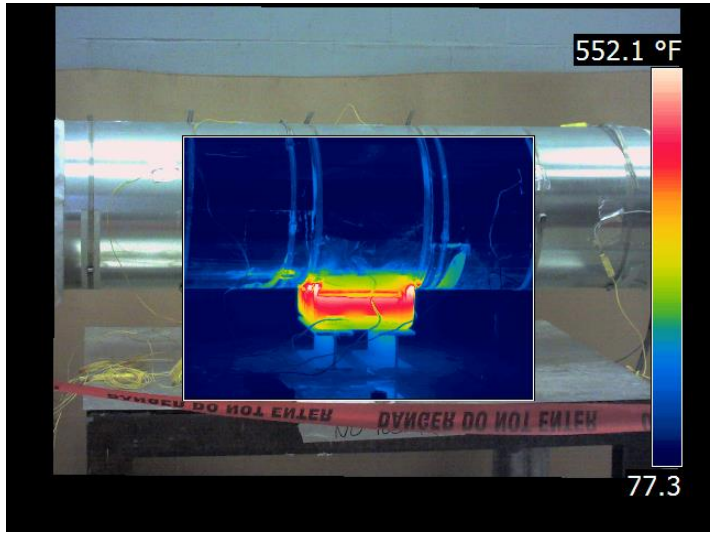


12” PROCESS SUPPORTS

621 Degree C

(1150 Degree F)





RILCO GUIDE SUPPORT

RILCO

RILCO PYROWRAP

HOT SERVICE PYROGEL XT
GUIDED
PRE-INSULATED PIPE SUPPORT

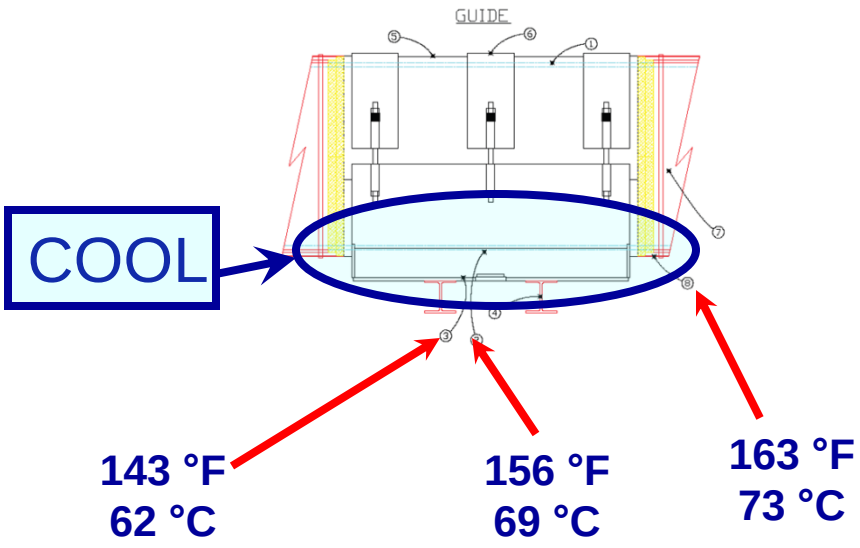
Pipe Size: 24”
Insulation Thickness: 20 mm
Length: 900 mm

Design Temperature: 343 Degree C (650 Degree F)

Vertical Load: 65 kN (14,613 lbf)
Lateral Load: 65 kN (14,613 lbf)
Axial Load: N/A

3.4
Kwatt/hour to Retain Heat Saturation

651 °F
344 °C
PIPE



WELD-ON SUPPORT

RILCO

SUNCOR

LS1-3-A-24”

WELDED PIPE SUPPORT

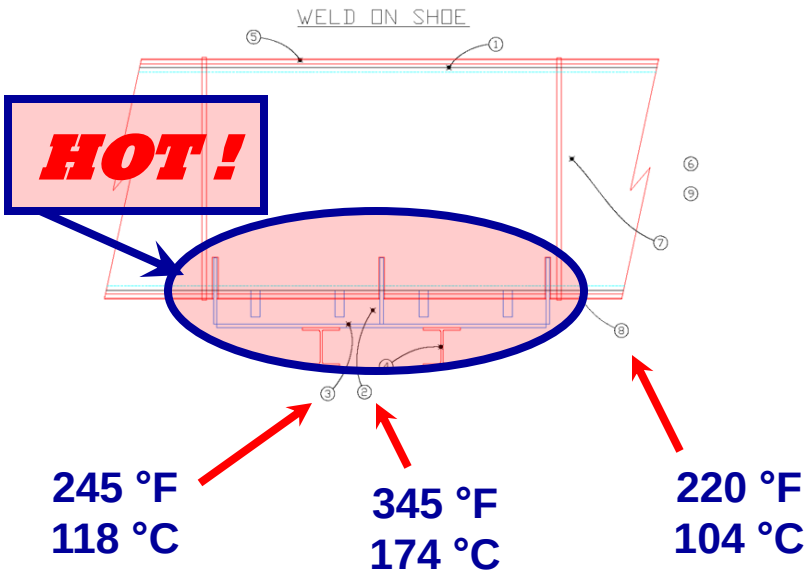
Pipe Size: 24”
Insulation Thickness: 0mm (20 mm over support)
Length: 900 mm

Design Temperature: 343 Degree C (650 Degree F)

Vertical Load: 65 kN (14,613 lbf)
Lateral Load: 65 kN (14,613 lbf)
Axial Load: N/A

4.6
Kwatt/Hour to Retain Heat Saturation

656 °F
347 °C
PIPE



ENERGY USAGE COMPARISON

ENERGY USAGE COMPARISON-PER *EACH* SUPPORT		
Weld-on vs Rilco Guide	**1.2**	Kwatt/Hour More Energy Reqired For Weld-on
Clamp-on vs Rilco Guide	1.5	Kwatt/Hour More Energy Reqired For Clamp-on

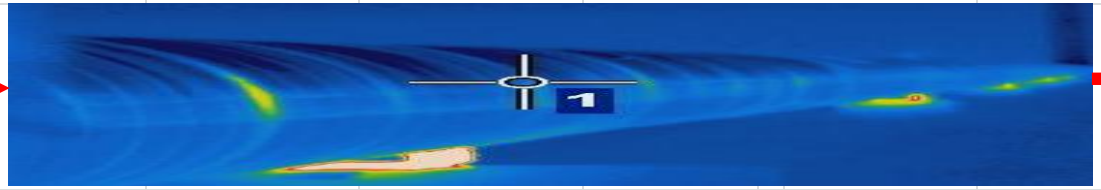
1.2 Kwatt/Hour Saved from EACH Support = 1.2 Kwatts saved PER HOUR
1000 Supports = 1,200 Kwatts PER HOUR
24 Hours in One Day = 28,800 Kwatts PER DAY
365 Days in One Year = 10,512,000 Kwatts PER YEAR
30 Year Plant Life Estimate = 315,360,000 Kwatts LIFE PLANT

CONVENTIONAL PIPELINE EFFICIENCY LOSSES AS COMPARED TO RILCO SUPPORTS

EVERY HOUR	8,331
EVERY DAY	199,936
EVERY YEAR	72,976,749

Cubic Feet of Natural Gas Energy is WASTED at pipe support points due to IN-Efficient supports

UPSTREAM ENERGY IN "X"



DOWNSTREAM ENERGY OUT "Y"

"Y" = "X" minus M Btu lost and wasting volumes of Cubic Feet of Gas

EVERY HOUR	8.56
EVERY DAY	205.53
EVERY YEAR	75,020.10

M Btu's are LOST at pipe support points due to IN-Efficient Supports

CASE #3: PRE-ASSEMBLY OF PIPELINES
TAKING THE MODULAR APPROACH TO BUILDING A PIPELINE

BENEFITS OF PRE-ASSEMBLED PIPELINES

ABILITY TO PRE-INSTALL OFFSITE MINIMIZING LAYDOWN SPACE ISSUES

PIPE SYSTEM CAN BE PRE-ASSEMBLED PRIOR TO PROJECT STARTUP

EFFICIENT PRE-INSTALLATION REDUCES LABOR TIME IMPROVING PROJECT SCHEDULE AND REDUCING COSTS

SAFE PRE-INSTALLATION AT WAIST HIGH CONDITIONS

VERY EFFICIENT ON STRAIGHT PIPING RUNS USING UP TO 80 FOOT LONG SECTIONS OF PIPE

PROVEN COST SAVINGS

OTHER BENEFITS OF PRE-INSULATED SUPPORTS

INSTALLATION

PRE-INSULATED SUPPORTS

VERSUS

SUPPORTS THAT WELD OR CLAMP DIRECTLY TO PIPE

INSTALLATION COMPARISONS

BETWEEN VARIOUS TYPES OF PIPE SUPPORTS

INSTALLATION PROBLEMS WITH *NON*-INSULATED SUPPORTS

WELD-ON SUPPORTS

1.) EXPENSIVE LABOR RATES TO WELD AND TIME CONSUMING WELDING AND FOR QC

2.) TIME CONSUMING LABOR TO TRIM INSULATION AND JACKET AROUND STEEL RIBS

EASY INSTALLATION USING PRE-INSULATED SUPPORTS

PRE-INSULATED SUPPORTS

1.) BOLT-ON TO PIPE FOR FAST SECURE INSTALLATION

2.) AFTER BOLTING YOU ARE FINISHED AS THE INSULATION AND JACKET ARE PART OF THE SUPPORT AND ARE INSTALLED AS WELL

CORROSION UNDER INSULATION

PRE-INSULATED SUPPORTS

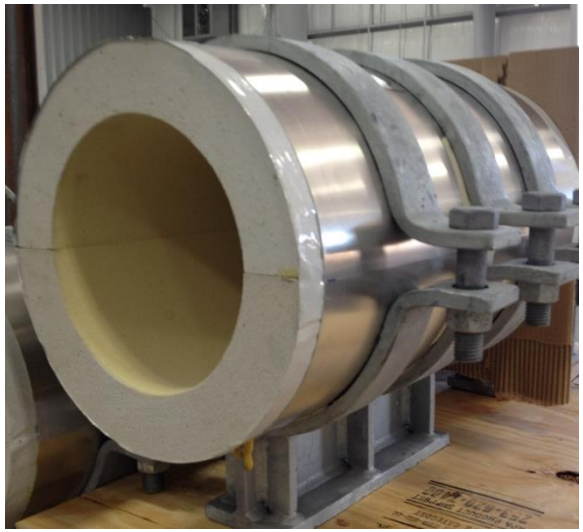
VERSUS

SUPPORTS THAT WELD OR CLAMP DIRECTLY TO PIPE

CORROSION UNDER INSULATION

PRE-INSULATED SUPPORTS TOTALLY ISOLATE THE PIPE FROM THE OUTSIDE STRUCTURE

PRE-INSULATED SUPPORTS



WELDED SUPPORT

CONDENSATION

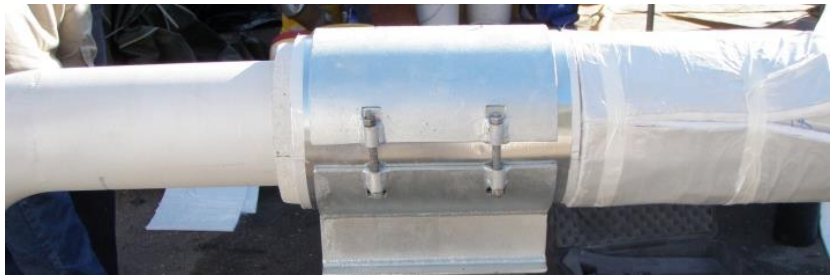
PRE-INSULATED SUPPORTS

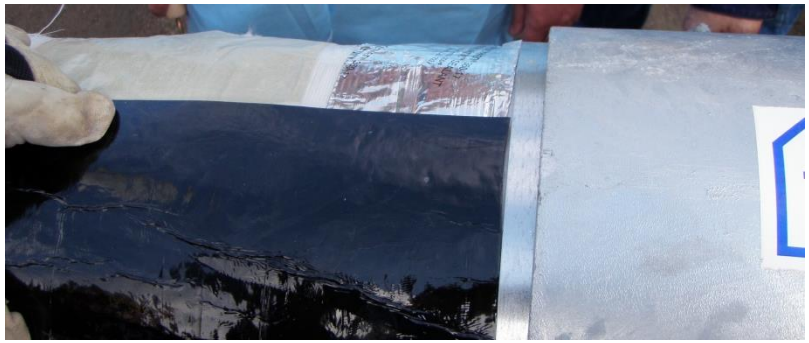
VERSUS

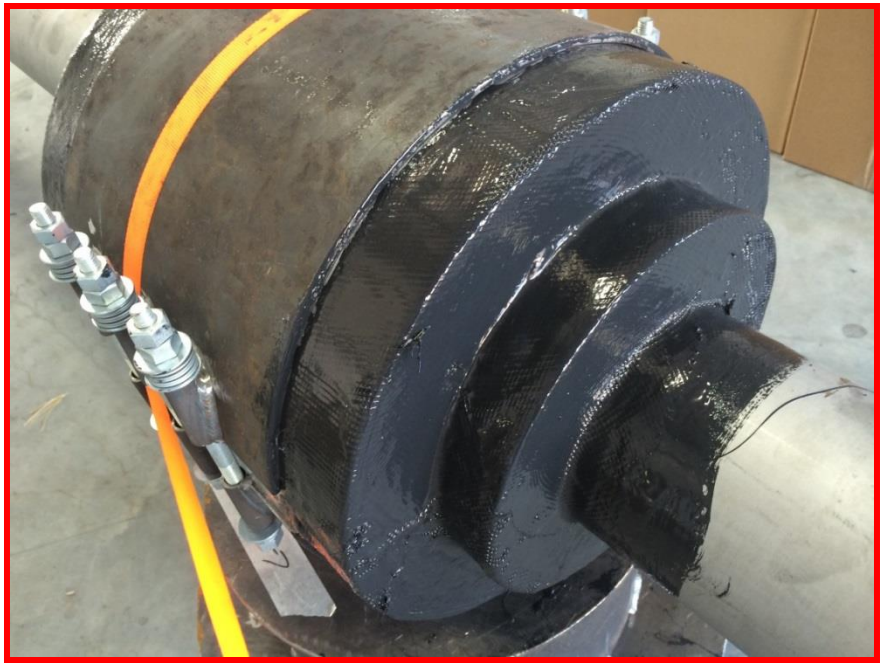
SUPPORTS THAT WELD OR CLAMP DIRECTLY TO PIPE

PRE-INSULATED SUPPORTS TOTALLY ISOLATE THE PIPE FROM THE OUTSIDE STRUCTURE

PRE-INSULATED SUPPORTS CAN INCLUDE A SEALED VAPOR BARRIER SYSTEM TO ELIMINATE CONDENSATION







PRE-INSULATED SUPPORT TYPES

RILCO PIPE SUPPORT INSULATION MATERIAL OPTIONS

ASPEN AEROGELS-PYROGEL-XTE
ASPEN AEROGELS-CRYOGEL-Z
CALCIUM SILICATE
ESLIN
FOAMGLAS
ARMACEL
HIGH DENSITY POLYURETHANE (PUF)
TRYMER
PERLITE

COMBINATIONS OF DIFFERENT INSULATIONS

SO, WHY USE PRE-INSULATED SUPPORTS ?

EFFICIENT - SAVES ENERGY
SAVES OEPERATING COST

EASY TO INSTALL - SAVES CONSTRUCTION TIME
SAVES CONSTRUCTION COST

BENEFITS – CAN BE BUILT USING VARIOUS TYPES OF INSULATION TO WORK WITH YOUR SYSTEM

THEY CARRY THE LOADS OF YOUR PIPE

PROTECT AGAINST CORROSION (CUI)

PROTECT AGAINST CONDENSATION

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DOESN'T IT MAKE SENSE TO

"EMBRACE THE CHANGE"

TO

PRE-INSULATED PIPE SUPPORTS ?

WANT TO LEARN MORE ABOUT PRE-INSULATED PIPE SUPPORTS?

COME VISIT ME AT **BOOTH 47**

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