

High density foams & chemicals  
**For Dual and Cryogenic temperature insulation**

# High density foams & chemicals For Dual and Cryogenic temperature insulation

Thermal Insulation Cryogenic Pipe Supports are used where mechanical characteristics are needed and process temperatures need to be maintained with a minimum heat gain.

High density polyurethane foams are the preferred materials for the manufacturing of pre-insulated cryogenic pipe supports, pipe shoes, plates and thermal breaks. They combine:

- low thermal conductivity
- high compressive strength
- resistance to thermal stress

They are also characterized by:

- Ozone Depletion Potential = 0
- Total absence of HCFC/CFC
- Operating temperature of the resulting item: -200°C/+205°C (-328°F/+400°F)



## Manufacturing of PIPE SUPPORTS



1. BY **INJECTION MOLDING TECHNIQUE**  
with the proper equipment  
DUNAPOL™ C SYSTEMS



2. BY **CUTTING/MILLING A BLOCK**  
(DUNA-Corradini Spa (Italy) can provide this service)  
CORAFOAM® (PIR/PUR Foam)  
CORINTHO® HT (Dual temperature)

- 200° C  
- 328° F

80° C  
176° F

100° C  
212° F

120° C  
248° F

up to +205° C  
up to +400° F

### 1. DUNAPOL™ C Systems for pipe supports



### CORAFOAM® PUR (Polyurethane Foams)



### 2. CORAFOAM® PIR (Polyisocyanurate Foams)



### BLUE CORINTHO® (Dual temperature)





# 1. Manufacturing of Pipe Supports by **INJECTION MOLDING:** **DUNAPOL™ C**

## Advantages:

- Obtain the largest support diameters in a single part.
- Reduced fabrication time, increased productivity
- Less labor
- Elimination of waste material

## DUNAPOL™ C systems offer:

- Operating temperature of the resulting item:  
-200°C/+100°C (-328°F/+212°F)

- Optimized extraction capacity and surface finishing, even with unheated molds.
- 1:1 ratio by weight between components to simple use by manual and automated systems.
- Fast demolding times.
- Exceed the limit value of 1,5 for CTSR (coefficient of thermal stress resistance) to achieve insulation integrity under thermal stress.
- Excellent horizontal and vertical flammability ratings
- Minimum shelf life of 6 months.

Common features:			
Mixing Ratio	POL/ISO	parts in weight	100/100
Fire reaction	DIN 4102	Class	B2
Fire reaction	EN 13501	Euroclass	E
Fire reaction	UL 94	Class	HBF
Shrinkage after demolding		%	<1
Coefficient of linear thermal expansion CTE (-196°C/+23°C, -320°F/73°F)	EN 13471/ASTM D696	1/K·10 <sup>-6</sup>	50
Closed-cell content	ASTM D 6226	%	>95
Leachable chloride content	ASTM C871	ppm	<60
pH			6-7
CTSR (-165°C/+23°C, -265°F/73°F)	CINI 2.7.01	---	>1,5
Operating temperature		°C °F	-200/+100 -328/+212
Water vapour transmission rate (23°C/73°F, 50%R.H.)	EN 12086/ASTM E96	g/m <sup>2</sup> ·h	0,8

DUNA-Group developed **3 families of high density** polyurethane foams to meet the specific requirements of different types of pipe-supports in terms of sizes, thicknesses and manufacturing techniques.

The selection of the right product is made considering:

- 1) available equipment
- 2) thickness of support/number of layers
- 3) requested density

Higher density systems (up to 500 kg/m<sup>3</sup> – 31,2 Lb/ft<sup>3</sup>) also available. Please contact DUNA-Group Technical Centre for information.



## DEMOLDING TIME:

**20'**  
**FAST**

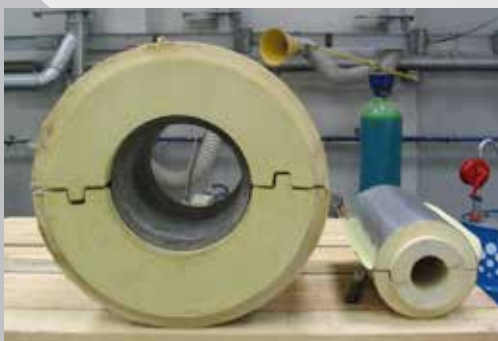
Molding thickness  
40 - 80 mm (1,6" - 3,2").  
Injection of low-thickness,  
multi layered supports.

**60'**  
**MEDIUM**

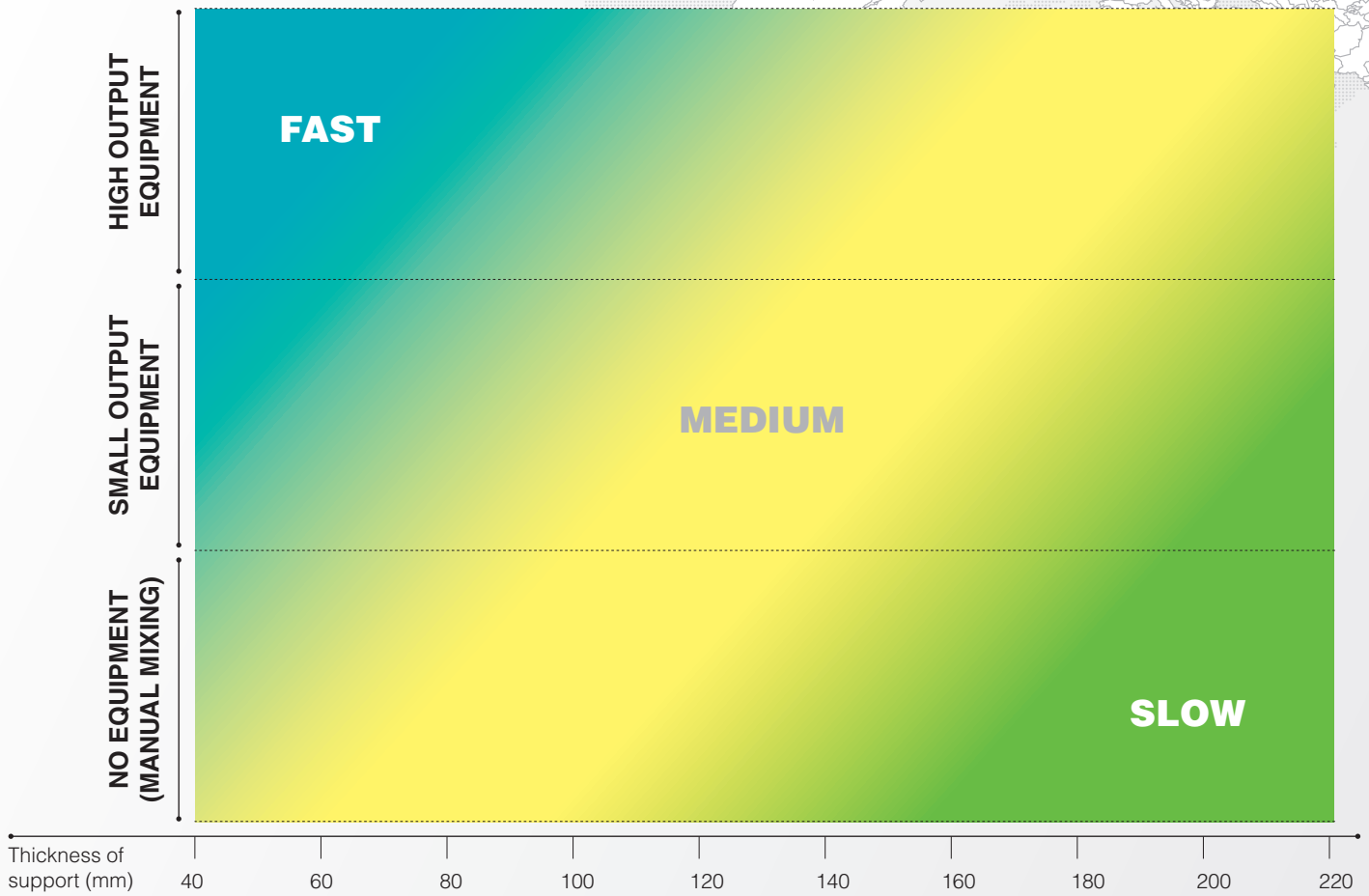
Molding thickness  
80 - 150 mm (3,2" - 6").  
Injection of monolithic high-  
thickness supports.

**180'**  
**SLOW**

Molding thickness  
150 - 200 mm (6" - 7,9").  
Injection of monolithic high-  
thickness supports, having  
a very large size.



SYSTEM SELECTION GUIDE



<b>Cream time</b>		h min' s"
<b>Gel Time</b>		h min' s"
<b>Free Rise density</b>	EN 1602 / ASTM D1622	kg/m <sup>3</sup> <i>Lb/ft<sup>3</sup></i>
<b>Applied density</b>	EN 1602 / ASTM D1622	kg/m <sup>3</sup> <i>Lb/ft<sup>3</sup></i>
<b>Minimal core density</b>	EN 1602 / ASTM D1622	kg/m <sup>3</sup> <i>Lb/ft<sup>3</sup></i>
<b>Thermal conductivity - Initial (10°C/50°F)</b>	EN 12667 / ASTM C518	W/mK <i>BTU·in/ hr·ft<sup>2</sup>·°F</i>
<b>Thermal conductivity - 180 days (10°C/50°F) - 25 mm/1" thickness sample, aged 180 days at 23°C/73°F, 50% R.H.)</b>	EN 12667 / ASTM C518 / ASTM C177	W/mK <i>BTU·in/ hr·ft<sup>2</sup>·°F</i>
<b>Fire reaction - Burnt length</b>	EN ISO 3582	mm <i>inches</i>
<b>Fire reaction - Extinguishing time</b>	EN ISO 3582	s
<b>Compressive Resistance - Parallel (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>
<b>Compressive Resistance -Parallel (-165°C/-265°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>
<b>Tensile strength - Parallel (23°C/73°F)</b>	EN 1607-08 / ASTM D1623	MPa <i>psi</i>
<b>Tensile strength - Parallel (-165°C/-265°F)</b>	EN 1607-08 / ASTM D1623-A	MPa <i>psi</i>
<b>Water absorption by volume</b>	ISO 2896 / EN 12087 / ASTM D2842	%

## FAST

Many project specifications require the pipe-supports to be made of 3 separate layers of high density foams. The multiple layering enables avoidance of radially-propagated cracks induced by stress from cryogenic thermal gradients.

These systems offer:

- **excellent flow rate** within narrow molds
- **fast reactivity** to shorten demolding times

## MEDIUM

When project specifications require the pipe-supports to be made in a single layer at medium/high thickness, typically ranging from 80 to 150 mm (3,2"-6"), a medium system is recommended.

These systems offer:

- **moderate cream-time** to allow longer pouring operations
- **fast reactivity** to obtain a relatively short demolding time

## SLOW

Slow rise systems for large, single-layer supports, with thickness between 150 and 200 mm (6"-7,9") These systems can be mixed manually, without a dispensing machine.

Several pipe supports manufacturers prefer to obtain large foam supports in a single, monolithic part; this technique requires a slow cream-time to allow the injection of a large material quantity in a single shot, both when dispensing with a metering machine, and when pouring after mixing with discontinuous equipment.

These systems offer:

- **long cream time** for prolonged pouring operations
- a relatively **short demolding time**, combined with slow reactivity

FAST			MEDIUM			SLOW		
DUNAPOL™ C 160 R	DUNAPOL™ C 224 R	DUNAPOL™ C 320 R	DUNAPOL™ C 160	DUNAPOL™ C 224	DUNAPOL™ C 320	DUNAPOL™ C 160 L	DUNAPOL™ C 224 L	DUNAPOL™ C 320 L
12"±2"	12"±2"	12"±2"	40"±5	30"±5	30"±5	1'10"±5"	1'10"±5"	1'10"±5"
1'25"±5"	1'25"±5"	1'25"±5"	3'30"±15"	3'20"±15"	3'10"±15"	5'45"±20"	5'50"±20"	5'35"±20"
115 <i>7.1</i>	175 <i>10.9</i>	216 <i>13.4</i>	120 <i>7.5</i>	170 <i>10.6</i>	245 <i>15.3</i>	110 <i>6.9</i>	155 <i>9.7</i>	240 <i>15.0</i>
175 <i>10.9</i>	240 <i>14.9</i>	350 <i>21.8</i>	180 <i>11.2</i>	240 <i>14.9</i>	350 <i>21.8</i>	180 <i>11.2</i>	260 <i>16.2</i>	360 <i>22.4</i>
>160 <i>&gt;10</i>	>224 <i>&gt;14</i>	>320 <i>&gt;20</i>	>160 <i>&gt;10</i>	>224 <i>&gt;14</i>	>320 <i>&gt;20</i>	>160 <i>10</i>	>224 <i>14</i>	>320 <i>20</i>
0,031 <i>0.21</i>	0,038 <i>0.26</i>	0,048 <i>0.33</i>	0,031 <i>0.21</i>	0,038 <i>0.26</i>	0,048 <i>0.33</i>	0,032 <i>0.22</i>	0,039 <i>0.27</i>	0,049 <i>0.34</i>
0,040 <i>0.27</i>	0,045 <i>0.31</i>	0,053 <i>0.36</i>	0,040 <i>0.27</i>	0,045 <i>0.31</i>	0,053 <i>0.37</i>	0,040 <i>0.27</i>	0,045 <i>0.31</i>	0,053 <i>0.36</i>
30 <i>1.2</i>	18 <i>0.7</i>	16 <i>0.6</i>	26 <i>1.0</i>	25 <i>1.0</i>	19 <i>0.8</i>	30 <i>1.2</i>	17 <i>0.7</i>	16 <i>0.6</i>
30	30	30	30	30	30	30	30	30
2,0 <i>290</i>	3,9 <i>565</i>	8,0 <i>1160</i>	2,1 <i>304</i>	3,9 <i>566</i>	8,1 <i>1175</i>	2,1 <i>304</i>	4,1 <i>595</i>	7,3 <i>1059</i>
4,4 <i>638</i>	8,8 <i>1276</i>	18,0 <i>2610</i>	6,4 <i>928</i>	12,2 <i>1769</i>	19,6 <i>2842</i>	6,4 <i>928</i>	12,6 <i>1827</i>	18,0 <i>2611</i>
1,9 <i>276</i>	3,0 <i>435</i>	6,3 <i>914</i>	2,1 <i>305</i>	3,2 <i>464</i>	4,9 <i>710</i>	2,0 <i>290</i>	3,1 <i>450</i>	4,9 <i>711</i>
2,2 <i>319</i>	3,6 <i>522</i>	5,4 <i>783</i>	2,3 <i>334</i>	3,4 <i>493</i>	5,4 <i>783</i>	2,2 <i>319</i>	3,4 <i>493</i>	5,4 <i>783</i>
0,8	0,5	0,4	0,8	0,5	0,4	0,8	0,5	0,4



## 2. Manufacturing of Pipe Supports from **FOAM BLOCKS**

DUNA-Group developed 3 families of high density foams in order to bear different operating temperatures.



OPERATING UP TO

**80° C**  
**(176° F)**

**CORAFOAM®**  
**PUR**

**120° C**  
**(248° F)**

**CORAFOAM®**  
**PIR**

**205° C**  
**(400° F)**

**CORINTHO®**  
**HT**

### **Advantages:**

- Consistency of mechanical & physical characteristics (Foam produced in continuous)
- Possibility of having different sizes from the same block
- Ready to install pieces after cutting
- No shelf life deadlines
- DUNA-Group has the capability to cut any Shape, including:
  - single layer with shiplap and/or butt joints
  - multiple layers with shiplap and/or butt joints
  - any shape of thermal breaks

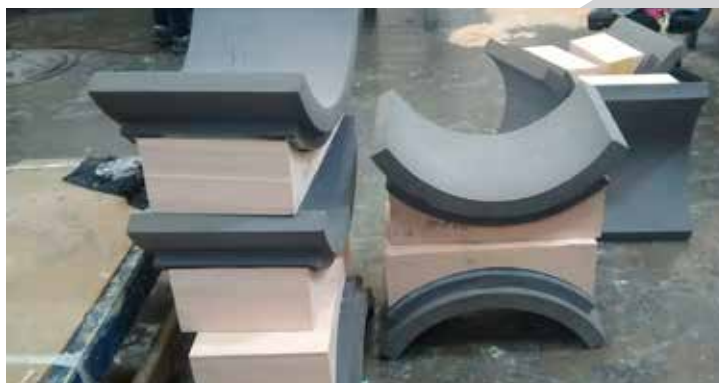


# PUR - POLYURETHANE FOAMS

	Standard	UM	MD 80	MD 140 U 80	MD 160 U 100	MD 250 U 150	MD 320 U 200	MD 500 U 310	CORINTHO® DEEP BLUE
<b>Nominal density</b>	EN ISO 845 / EN 1602 / ASTM D1622	kg/m <sup>3</sup> <i>Lb/ft<sup>3</sup></i>	80 <i>5.0</i>	140 <i>8.7</i>	160 <i>10.0</i>	250 <i>15.6</i>	320 <i>20.0</i>	490 <i>30.5</i>	700 <i>43.7</i>
<b>Compressive resistance - Parallel (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>	0,80 <i>116</i>	1,65 <i>239</i>	2,00 <i>290</i>	4,40 <i>638</i>	7,20 <i>1044</i>	16,80 <i>2437</i>	13,00 <i>1885</i>
<b>Compressive Resistance - Perpendicular (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>	0,64 <i>93</i>	1,55 <i>225</i>	1,90 <i>276</i>	4,30 <i>623</i>	7,00 <i>1015</i>	16,20 <i>2349</i>	...
<b>Compressive modulus - Parallel (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>	26 <i>3770</i>	56 <i>8122</i>	65 <i>9427</i>	130 <i>18854</i>	190 <i>27557</i>	440 <i>63816</i>	154 <i>22336</i>
<b>Compressive Modulus - Perpendicular (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>	15 <i>2175</i>	48 <i>6961</i>	59 <i>8557</i>	125 <i>18129</i>	185 <i>26831</i>	375 <i>54389</i>	...
<b>Flexural strength - Parallel, Met. I (23°C/73°F)</b>	EN 12089 / ASTM C203	MPa <i>psi</i>	1,3 <i>189</i>	2,2 <i>319</i>	2,8 <i>406</i>	6,4 <i>928</i>	10,0 <i>1450</i>	22,5 <i>3264</i>	11,0 <i>1596</i>
<b>Tensile strength - Parallel (23°C/73°F)</b>	EN 1607 / ASTM D 1623-A	MPa <i>psi</i>	1,3 <i>189</i>	1,9 <i>276</i>	2,3 <i>334</i>	4,3 <i>624</i>	6,4 <i>928</i>	11,4 <i>1653</i>	5,6 <i>682</i>
<b>Tensile strength - Perpendicular (23°C/73°F)</b>	EN 1607 / ASTM D 1623-A	MPa <i>psi</i>	1,05 <i>152</i>	1,70 <i>247</i>	2,10 <i>305</i>	4,20 <i>609</i>	6,20 <i>899</i>	11,20 <i>1624</i>	...
<b>Shear strength - Perpendicular (23°C/73°F)</b>	EN 12090 / ASTM C273	MPa <i>psi</i>	0,58 <i>84</i>	0,85 <i>123</i>	0,97 <i>140</i>	1,15 <i>167</i>	1,77 <i>257</i>	...	...
<b>Shear Modulus - Perpendicular (23°C/73°F)</b>	EN 12090 / ASTM C273	MPa <i>psi</i>	4,5 <i>653</i>	8,5 <i>1232</i>	10,2 <i>1479</i>	13,6 <i>1973</i>	17,0 <i>2466</i>	...	...
<b>Thermal conductivity - Initial (10°C/50°F)</b>	EN 12667 / ASTM C518 / ASTM C177	mW/mK <i>BTU·in/ hr·ft<sup>2</sup>·°F</i>	23,2 <i>0.16</i>	29,0 <i>0.20</i>	31,0 <i>0.22</i>	42,0 <i>0.29</i>	51,0 <i>0.35</i>	70,0 <i>0.49</i>	99,9 <i>0.70</i>
<b>Thermal conductivity - 180 days (20°C/68°F), (25 mm/1" thickness sample aged 180 days at 23°C/73°F, 50% R.H.)</b>	EN 12667 / ASTM C518	mW/mK <i>BTU·in/ hr·ft<sup>2</sup>·°F</i>	...	...	39,8 <i>0.28</i>	45,6 <i>0.32</i>	55,5 <i>0.38</i>	75,0 <i>0.52</i>	...
<b>Coefficient of thermal stress resistance CTSR (-165°C/+23°C, -265°F/+73°F)</b>	CINI 2.7.01	---	>2	>3	>3	>3	>3	>3	>2,5
<b>Coefficient of linear thermal expansion CTE (-196°C/+23°C, -321°F/+73°F)</b>	EN 13471 / ASTM D696	1/K · 10 <sup>-6</sup>	50	50	50	50	45	45	58
<b>Fire reaction</b>	DIN 4102	Class	B3	B3	B3	B3	B3	B3	B2
<b>Fire reaction</b>	UL 94	Class	...	...	...	...	...	...	HBF
<b>Operating temperature</b>	---	°C °F	-200/+80 <i>-328/+176</i>	-200/+80 <i>-328/+176</i>	-200/+80 <i>-328/+176</i>	-200/+80 <i>-328/+176</i>	-200/+80 <i>-328/+176</i>	-200/+80 <i>-328/+176</i>	-200/+80 <i>-328/+176</i>
<b>Water absorption by volume</b>	ISO 2896 / EN 12087 / ASTM D2842	%	<2,5	<1,5	<1,5	<1,0	<1,0	<0,4	...
<b>Closed-cell content</b>	EN ISO 4590 / ASTM D 6226	%	>95	>95	>95	>95	>95	>95	...
<b>Leachable chlorides</b>	EN 13468/ ASTM C871	ppm	<60	<60	<60	<60	<60	<60	<60

# PIR - POLYISOCYANURATE FOAMS

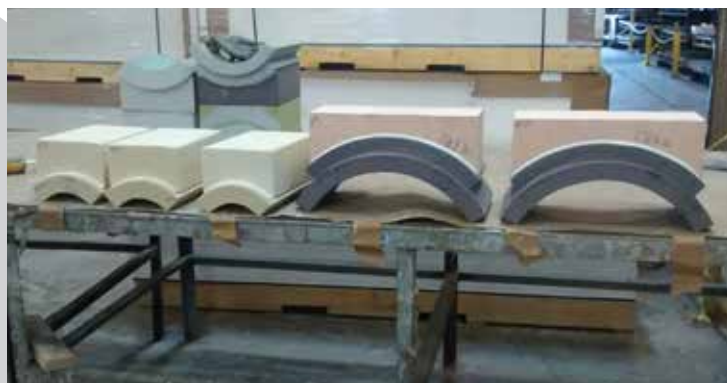
	Standard	UM	RTS 80	RTS 120	RTS 160	RTS 240	RTS 320
<b>Nominal density</b>	EN ISO 845 / EN 1602 / ASTM D1622	kg/m <sup>3</sup> <i>Lb/ft<sup>3</sup></i>	83 <i>5.2</i>	120 <i>7.5</i>	161 <i>10.0</i>	240 <i>15.0</i>	320 <i>20.0</i>
<b>Compressive Resistance - Parallel (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>	0,90 <i>130</i>	1,68 <i>244</i>	2,40 <i>348</i>	4,50 <i>653</i>	7,50 <i>1088</i>
<b>Compressive Resistance - Perpendicular (23°C/73°F)</b>	EN 826 / ASTM D1621	MPa <i>psi</i>	0,71 <i>103</i>	1,50 <i>218</i>	2,20 <i>319</i>	4,40 <i>638</i>	7,40 <i>1073</i>
<b>Tensile Strength - Parallel (23°C/73°F)</b>	EN 1607 / ASTM D1623- A	MPa <i>psi</i>	1,2 <i>174</i>	1,9 <i>276</i>	2,4 <i>348</i>	4,0 <i>580</i>	6,2 <i>899</i>
<b>Tensile strength - Perpendicular (23°C/73°F)</b>	EN 1607 / ASTM D 1623- A	MPa <i>psi</i>	1,0 <i>145</i>	1,7 <i>247</i>	2,2 <i>319</i>	3,8 <i>551</i>	6,0 <i>870</i>
<b>Shear Strength - Perpendicular (23°C/73°F)</b>	EN 12090 / ASTM C273	MPa <i>psi</i>	0,55 <i>78</i>	0,67 <i>97</i>	0,75 <i>109</i>	...	...
<b>Thermal conductivity - Initial (10°C/50°F)</b>	EN 12667 / ASTM C518 / ASTM C177	mW/mK <i>BTU-in/ hr-ft<sup>2</sup>·°F</i>	25,5 <i>0.18</i>	28,0 <i>0.20</i>	31,0 <i>0.22</i>	41,0 <i>0.28</i>	49,0 <i>0.34</i>
<b>Thermal conductivity - 180 days (10°C/50°F) (25 mm/1" thickness sample aged 180 days at 23°C/73°F, 50% R.H.)</b>	EN 12667 / ASTM C518 / ASTM C177	mW/mK <i>BTU-in/ hr-ft<sup>2</sup>·°F</i>	33,0 <i>0.23</i>	35,0 <i>0.24</i>	39,0 <i>0.27</i>	47,0 <i>0.33</i>	56,0 <i>0.39</i>
<b>Coefficient of thermal stress resistance CTSR (-165°C/+23°C, -265°F/+73°F)</b>	CINI 2.7.01		>3	>3	>4	>4	>4
<b>Coefficient of linear thermal expansion CTE (-196°C/+23°C, -321°F/+73°F)</b>	EN 13471 / ASTM D696	1/K·10 <sup>-6</sup>	45	40	40	45	45
<b>Fire reaction</b>	DIN 4102	Class	B2	B2	B2	B2	B2
<b>Fire reaction (maximum extent of burnt length)</b>	EN ISO 3582	mm <i>inches</i>	≤15 <i>≤0.6</i>	≤15 <i>≤0.6</i>	≤15 <i>≤0.6</i>	≤15 <i>≤0.6</i>	≤15 <i>≤0.6</i>
<b>Fire reaction (extinguishing time)</b>	EN ISO 3582	s	≤10	≤10	≤10	≤10	≤10
<b>Water vapour transmission rate (23°C/73°F, 85% R.H.)</b>	EN 12086 / ASTM E96	g/m <sup>2</sup> h <i>grains/h-ft<sup>2</sup></i>	1,04 <i>1.49</i>	0,63 <i>0.90</i>	0,63 <i>0.90</i>	0,50 <i>0.72</i>	...
<b>Operating temperature</b>		°C °F	-200/+120 <i>-328/+248</i>	-200/+120 <i>-328/+248</i>	-200/+120 <i>-328/+248</i>	-200/+120 <i>-328/+248</i>	-200/+120 <i>-328/+248</i>
<b>Water absorption by volume</b>	ISO 2896 / EN 12087 / ASTM D2842	%	<2,5	<1,5	<1,5	<1,0	<1,0
<b>Closed cell content</b>	EN ISO 4590 / ASTM D6226	%	>95	>95	>95	>95	>95
<b>Leachable chlorides</b>	EN 13468 / ASTM C871	ppm	<60	<60	<60	<60	<60





# CORINTHO® HT - DUAL TEMPERATURE

	Standard	UM	BLUE CORINTHO® HT
Nominal density	EN ISO 845 / EN 1602 / ASTM D1622	kg/m <sup>3</sup> <i>Lb/ft<sup>3</sup></i>	700 <i>43.7</i>
Compressive Resistance - Parallel (23°C/73°F)	EN 826 / ASTM D1621	MPa <i>psi</i>	28 <i>4061</i>
Compressive Modulus - Parallel (23°C/73°F)	EN 826 / ASTM D1621	MPa <i>psi</i>	450 <i>65267</i>
Flexural strength - Parallel, Met.I (23°C/73°F)	EN 12089 / ASTM C203	MPa <i>psi</i>	23 <i>3336</i>
Flexural Modulus - Parallel (23°C/73°F)	EN 12089 / ASTM C203	MPa <i>psi</i>	750 <i>108778</i>
Max.Strain, Met.I	EN 12089 / ASTM C203	mm/mm <i>in/in</i>	3,5
Tensile strength - Parallel (23°C/73°F)	EN 1607 / ASTM D1623-A	MPa <i>psi</i>	11,7 <i>1697</i>
Tensile E-Modulus - Parallel (23°C/73°F)	EN 1607 / ASTM D1623-A	MPa <i>psi</i>	245 <i>35534</i>
Tensile strength - Parallel (-165°C/-265°F)	EN 1607 / ASTM D1623-A	MPa <i>psi</i>	12,2 <i>1769</i>
Tensile E-Modulus - Parallel (-165°C/-265°F)	EN 1607 / ASTM D1623-A	MPa <i>PSI</i>	412 <i>59756</i>
Thermal conductivity - Initial (20°C/68°F)	EN 12667 / ASTM C518	mW/mK <i>BTU-in/hr-ft<sup>2</sup>-°F</i>	107,9 <i>0.75</i>
Thermal conductivity - Initial (10°C/50°F)	EN 12667 / ASTM C518 / ASTM C177	mW/mK <i>BTU-in/hr-ft<sup>2</sup>-°F</i>	105,3 <i>0.73</i>
Coefficient of thermal stress resistance CTSR (-165°C/+23°C, -265°F/+73°F)	CINI 2.7.01		>1,5
Coefficient of linear thermal expansion CTE (-196°C/+23°C, -321°F/+73°F)	EN 13471 / ASTM D696	1/K·10 <sup>-6</sup>	40,6
Fire reaction	DIN 4102	Class	B2
Fire reaction (maximum extent of burnt length)	EN ISO 3582	mm <i>inches</i>	<10 <i>0.4</i>
Fire reaction (extinguishing time)	EN ISO 3582	s	<10
Fire reaction	UL 94	Class	HBF
Fire reaction	FAR 25-853A		12"/60" Passed
Leachable chlorides	EN 13468 / ASTM C871	ppm	<60
Hardness	EN ISO 868 / ASTM D2240	Shore D	63
Glass transition temperature (Tg)	EN ISO 113572 / ASTM E1356	°C <i>°F</i>	265 <i>509</i>
Operating temperature		°C <i>°F</i>	-200/+205 <i>-328/+400</i>





# ANCILLARIES - ADHESIVES DUNAPOL™ AD



## ONE PART ADHESIVES

- Ready to use
- Easy to apply with plastic containers
- Reaction can speed up spraying water on the adhesive
- cleaner work place
- same mechanical properties compared to 2 part adhesives



## TWO PART ADHESIVES

- Complete reaction in all environmental conditions
- wide range of reaction times

### Operating temperature:

**-165°C/+80°C (-265°F/+176°F)**

Effective structural polyurethane adhesives that remain flexible to accommodate materials contractions.

They are recommended for bonding:

- Different layers of insulation (PIR, PUR, cellular glass, mineral wool, pipe shells, pipe supports, etc.)
- Metals to insulating materials.
- Panels to tank walls/roofing.

## One Part adhesives:

Example:

One component structural polyurethane adhesive, developed for gluing various materials such as metals, plastic materials, expanded materials (polyurethane, polystyrene, phenolic etc.), laminates, fiberglass laminates, wood etc.

	Standard/ Description	UM	DUNAPOL™ AD 3290 V5
<b>Colour</b>			Yellow liquid
<b>Density (25°C/77°F)</b>	ASTM D891	g/ml	1,07-1,11
<b>Viscosity (25°C/77°F)</b>	ASTM D2196	mPa·s <i>P</i>	11000-14000 <i>110-140</i>
<b>Minimum application temperature</b>		°C °F	+10 <i>+50</i>
<b>Open time (25°C/77°F)</b>	in film	h min' s"	40'-45'
<b>Gel time (25°C/77°F)</b>	in film	h min' s"	1h15'-1h30'
<b>Handling time (25°C/77°F)</b>		h min' s"	4h
<b>Complete hardening</b>		days	7-8
<b>Coverage rate</b>		g/m <sup>2</sup>	100-300
<b>Suggested thickness</b>		mm <i>inches</i>	0,1-0,3 <i>0.004-0.011</i>
<b>Operating temperature</b>		°C °F	-165/+80 <i>-265/+176</i>
<b>Open time (with 15-20% water spray, 25°C/77°F)</b>		h min' s"	18'-22'
<b>Gel time (with 15-20% water spray, 25°C/77°F)</b>		h min' s"	40'-45'
<b>Storage temperature</b>		°C °F	10-35 <i>50-95</i>
<b>Shelf life</b>		Months	6
<b>Non volatiles</b>		%	>99,8

## Two Part adhesives:

- Guaranteed reaction in all environmental conditions
- Wide range of reaction times
- Products require mixing
- Available in cartridge

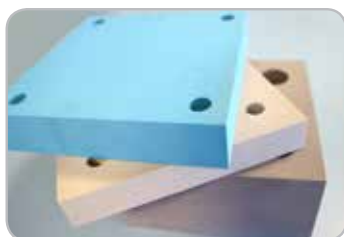
	Standard/ Description	UM	DUNAPOL™ AD 1576	DUNAPOL™ AD 1575 M	DUNAPOL™ AD 1566	DUNAPOL™ AD 1586
<b>Mixing ratio by weight POL/ISO</b>		parts	100/20	100/20	100/20	100/20
<b>Minimum application temperature</b>		°C °F	+10 +50	+10 +50	+10 +50	+10 +50
<b>Viscosity (25°C/77°F)</b>	ASTM D2196	mPa·s <i>P</i>	Thixotropic	Thixotropic	5.500-7.500 <i>55-75</i>	Thixotropic
<b>Time of use in mass (25°C/77°F)</b>	200 ml	h min' s"	50'-1h10'	50'-1h10'	15'-20'	n.d.
<b>Open time (25°C/77°F)</b>			1h30'-2h	1h40'-2h10'	25'-35'	50'-1h
<b>Gel time (25°C/77°F)</b>			2h50'-3h20'	2h50'-3h20'	50'-60'	1h35'-1h45'
<b>Handling time (25°C/77°F)</b>			8h-10h	8h-10h	3h-4h	4h-5h
<b>Press time (25°C/77°F)</b>			6h-7h	6h-7h	2h-3h	3h-4h
<b>Complete hardening</b>		days	8-10	8-10	5-7	7-8
<b>Coverage rate</b>		g/m <sup>2</sup> lb/ft <sup>2</sup>	500-700 <i>0.1024-0.1434</i>	500-700 <i>0.1024-0.1434</i>	500-700 <i>0.1024-0.1434</i>	500-700 <i>0.1024-0.1434</i>
<b>Colour</b>			Beige	White	Beige	Beige
<b>Density (25°C/77°F)</b>	ASTM D891	g/ml lb/ft <sup>3</sup>	1,33-1,36 <i>83.03-84.90</i>	1,43-1,45 <i>89.27-90.52</i>	1,38-1,40 <i>86.15-87.40</i>	1,39-1,41 <i>86.78-88.02</i>
<b>Operating temperature</b>		°C °F	-165/+80 <i>-265/+176</i>	-165/+80 <i>-265/+176</i>	-165/+80 <i>-265/+176</i>	-165/+80 <i>-265/+176</i>
<b>Glass transition temperature</b>	EN ISO 113572 / ASTM E 1356	°C °F	13-15 <i>55-59</i>	9-11 <i>48-52</i>	5-7 <i>41-45</i>	9-11 <i>48-52</i>
<b>Hardness</b>	ASTM D2240	Shore A15	90-92	80-85	91-93	n.d.
<b>Water absorption (1h, 100°C/212°F)</b>	ASTM D570/ UNI EN ISO 62:2008	%	0,4-0,6	0,4-0,6	0,4-0,6	0,4-0,6
<b>Water absorption (24h, 20°C/68°F)</b>	ASTM D570/ UNI EN ISO 62:2008	%	0,15-0,20	0,02-0,10	0,15-0,25	0,15-0,20
<b>Shear by tension strength (25°C/77°F) Steel-steel</b>	ASTM D1002	MPa <i>psi</i>	8,5-9,5 <i>1233-1378</i>	11,0-12,0 <i>1595-1740</i>	11,0-12,0 <i>1595-1740</i>	n.d.
<b>Shear by tension strength (25°C/77°F) Aluminium-aluminium</b>	ASTM D 1002	MPa <i>psi</i>	9,8-10,5 <i>1421-1523</i>	12,0-13,0 <i>1740-1885</i>	9,0-10,0 <i>1305-1450</i>	n.d.
<b>Compression strength (25°C/77°F)</b>	ASTM D695/ UNI EN ISO 604:2008	MPa <i>psi</i>	60-65 <i>8702-9427</i>	25-30 <i>3625-4351</i>	60-65 <i>8702-9427</i>	n.d.
<b>Tensile strength (25°C/77°F)</b>	ASTM D638	MPa <i>psi</i>	2,5-3,5 <i>363-508</i>	9,0-10,0 <i>1305-1450</i>	3,0-4,0 <i>435-580</i>	n.d.
<b>Elongation</b>	ASTM D638	%	75-85	70-75	65-75	
<b>Fire reaction (maximum extent of burnt length)</b>	EN ISO 3582	mm <i>inches</i>	15 <i>0.6</i>	n.d.	10 <i>0.39</i>	n.d.
<b>Fire reaction (extinguishing time)</b>	EN ISO 3582	s	120	n.d.	120	n.d.
<b>Fire reaction</b>	DIN 4102	Class	B2	n.d.	B2	n.d.
<b>Non volatiles</b>		%	>99,3	>99,3	>99,3	n.d.

**Disclaimer:**

All values shown in this leaflet are determined from laboratory tests and obtained under controlled conditions; they outline typical characteristics and do not constitute in any way a sales specification; they are based on DUNA-Group's current knowledge and experience of the products when properly stored, handled and applied in accordance with our recommendations.

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