PRODUCT DATA SHEET

UrePac® Cryo 90 420

System Description

UrePac® Cryo 90 420 is a two component, polyurethane rigid foam comprising of a polyether polyol and MDI based isocyanate. The system has been developed with slow reactivity for hand pouring of LNG pipe supports.

Product Description and Features.

The system has been developed with excellent properties down to minus 196°C and to meet all constructor requirements for Liquid Natural Gas (LNG) structural insulation applications..

- Excellent Insulation
- Slow Reactivity
- Low viscosity
- Excellent low temperature stability

UrePac Cryo 90 420 (Polyol) Specification:

Specific Gravity (22°C):	1.07 +- 0.02 g/ml
Viscosity (Brookfield) (22°C):	400 +- 100 m.Pas

Spindle 3 Speed 50

Appearance:	Clear pale amber liquid

UrePac 2001 (Isocyanate) Specification:

Specific Gravity (22°C):	1.23 +- 0.02 g/ml
Viscosity (Brookfield) (22°C):	210 +- 70 m.Pas

Spindle 1 Speed 50

Appearance:	Clear Brown liquid

Mixed System Specification

Mix Ratio:	By Weight	100 Polyol (Part A): 96 Isocyanate (Part B)
	By Volume	100 Polyol (Part A): 84 Isocyanate (Part B)
Cream Time (22°C):		90+-5 seconds

Time from when mixing commences till the liquid starts to expand.

String time (22°C):	250+-10 seconds

Time from when mixing commences till "strings can be pulled from the surface of the rising foam.

Rise time (22°C):	360+-20 seconds

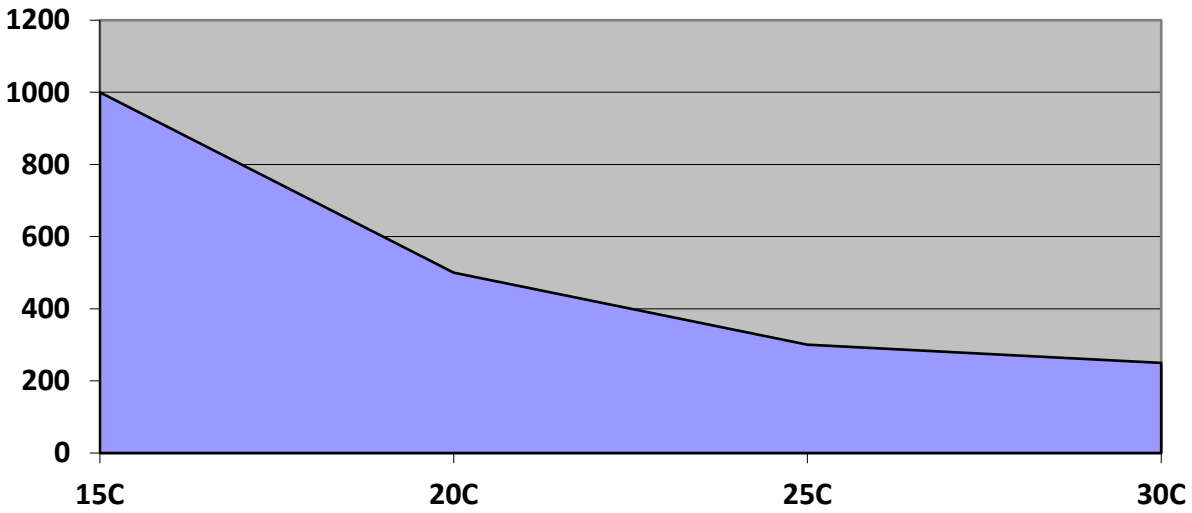
Time from when mixing commences till the foam finishes expanding.

Typical Demould (35°C)	Overnight
Free Rise Density (22°C):	420+-20 Kg/m^3

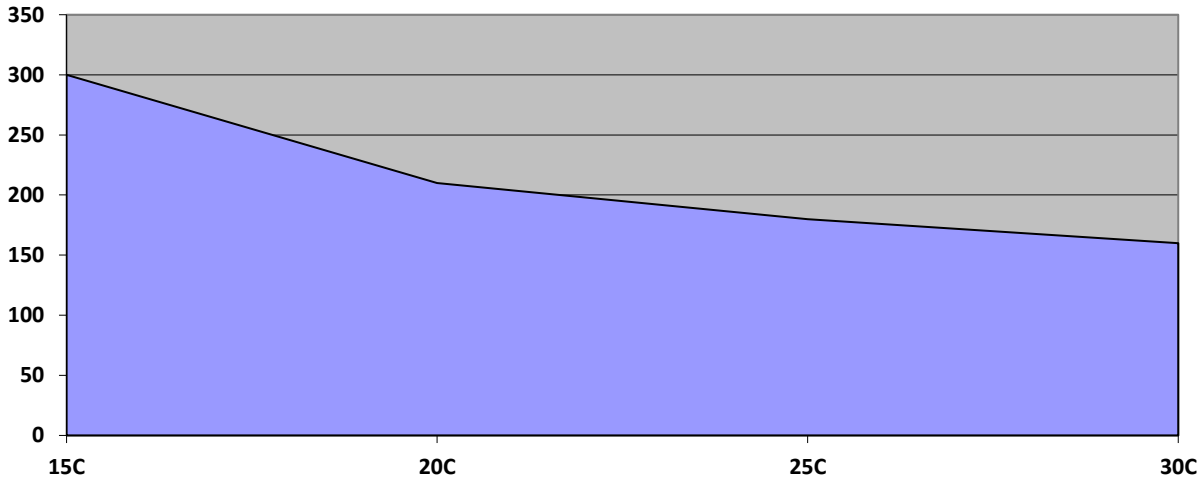
(Obtained from Laboratory 50g cup test, results will vary depending on mix quantities)

Viscosity vs. Temperature

Polyol



Isocyanate



Packaging Options:

Packaging	Component A (Polyol)	Component B (Isocyanate)
23L White Open top pail	**20kg**	**22kg**
60L Open Top Drum	**60kg**	**66kg**
205L Closed Head Drum	**210kg**	**250kg**
1000L IBC	**1050kg**	**1250kg**

Typical Cured Foam Properties

After 7 days cure @ 22°C unless otherwise specified.

Core Density:	ASTM D1622	500+-10 Kg/m^3
Dimensional Stability (70°C)	+-5% (@ 24 hours)	Pass
Closed Cell Content:	ASTM D6226	99-100%
K Value (22°C):	ASTM C518	0.0770 W/mK
K Value (-165°C):	ASTM C518	0.0570 W/mK
Compressive Strength(22°C):	ASTM D1621	22.0 MPa
Compressive Strength(-165°C):	ASTM D1621	31.0 MPa
Tensile Strength(22°C):	ASTM D1623	11.0 MPa
Tensile Strength(-165°C):	ASTM D1623	11.0 MPa
Water Absorption	ASTM D8242	>0.2%
Horizontal Burn	ISO 3582	
Burn Time:	5 sec	
Burn Length:	10 mm	
Burn Rate:	0.154 mm/sec	
Operating Temperatures:	+90°C to -196°C	

Storage

Component A should be stored in closed containers under dry conditions out of direct sunlight between 18 and 25°C.

Component B should be stored separately from *Component A*, but under the same conditions.

Both products will have a minimum shelf life of six months when stored under these conditions.

Cured Product: Like all polyurethanes based on aromatic isocyanates this foam is **not** UV stable and will have surface discolouration and degradation if exposed to UV radiation and sunlight. Please speak to our technical consultants regarding your options if this product is required for use in external applications.

Typical Chemical Resistance Chart

3 Suitable for long term use

2 Suitable for Short to Medium term exposure

1 Very short term exposure (i.e. will withstand spills that are cleaned off within an hour)

0 Not suitable to any exposure

Chemical	Result @ 22°C	Chemical	Result @ 22°C
Acetic Acid	**1**	**Acetone**	**1**
Ammonium Hydroxide (50%)	**1**	**Benzene**	**1**
Brine Saturated H_2O	**3**	**Chlorinated Water**	**3**
Diesel Fuel	**3**	**Petroleum**	**3**
Petroleum/10% Ethanol	**3**	**Hydrochloric Acid (37%)**	**2**
Hydrofluoric Acid (10%)	**2**	**Hydraulic Oil**	**3**
Isopropyl alcohol	**3**	**Lactic Acid**	**2**
MEK	**1**	**Methanol**	**3**
Methylene Chloride	**1**	**Mineral Spirits**	**2**
Motor Oil	**3**	**Nitric Acid (50%)**	**0**
Phosphoric Acid (10%)	**3**	**Phosphoric Acid (50%)**	**2**
Potassium Hydroxide (10%)	**3**	**Potassium Hydroxide (20%)**	**3 (Discolouration)**
Propylene Carbonate	**2**	**Sodium Hydroxide (25%)**	**1**
Sodium Hydroxide (50%)	**0**	**Sodium Hypochlorite (10%)**	**3**
Sodium Bicarbonate	**3**	**Stearic Acid**	**1**
Sugar/H_2O	**3**	**Sulphuric Acid (10%)**	**1**
Sulphuric Acid (50%)	**0**	**Toluene**	**3**
1,1,1 Trichloroethane	**1**	**Trisodium Phosphate**	**3**
H_2O	**3**	**Vinegar/H_2O (5%)**	**3**
Xylene	**2**	**H_2O (14 Days @70°C)**	**3**

Processing Conditions:

Component Preparation

Component A (polyol) does not need to be mixed prior to use.

Component B (isocyanate) does not need to be mixed prior to use.

Both Components should be preconditioned to 22-25°C to ensure that the components will have consistent reactivity and performance. If processing in a machine this usually requires recirculation for at least an hour prior to production commencing.

Mould Preparation

The mould should have a clean dry surface and should be uniformly heated to approximately 35-45°C for optimal skin reproduction. We recommend a wax based release agent. The mould should also have vent holes up to a maximum of 5mm in diameter to vent the air as it is displaced by the rising foam. However the mould cavity should also be well sealed, as any leakage of foam will mean higher shot weights to fill the cavity, and also increase the trimming requirements of the finished part. If there is pressure loss in the mould it will also cause the foam to have large voiding/cell collapse due to the pressure differential in the expanding foam.

The mould should also be built strong enough to handle the pressure build up caused by the over-packing of the foam as it expands in the closed mould. The actual pressures generated will vary depending on the percentage of overpack. Our technical consultants will be happy to discuss your mould design requirements with you if required. For rigid foams the moulds should have a slight taper to ensure that de-moulding of the cured product is possible.

Shot Weight Calculation

The amount of foam required to fill a mould cavity is dependent on the free rise density of the system, and also the volume of the cavity to be filled. Our Technical consultants will be happy to make this calculation for you, but here is a typical example of how it is calculated for your reference:

Free Rise Density: 34kg/m^3

Mould Volume: 0.09 m^3

Overpack: 10% (This is important to ensure that the cavity is filled)

Therefore Target Moulded Density: 38kg/m^3

Shot Weight (in Kg) = 0.09 (Volume) x 38 (Moulded Density of Foam)

Shot Weight = 3.42Kg

Then to determine the amount of each component to add:

Mix Ratio = 100 Polyol :120 Isocyanate

Polyol Weight = Shot Weight (3.42) / Isocyanate + Polyol Ratio (100+120) x Polyol Ratio (100)

Polyol Weight = 3.42 / 220 x 100

Polyol Weight = 1.55kg

Isocyanate Weight = Shot Weight (3.42) – (Polyol Weight) 1.55

Isocyanate Weight = 1.87kg

Caution: Please ensure that the volume of the mould and shot weight is accurately determined. If too much material is added to the mould then very high levels of pressure can be generated from the reacting foam.

Dispensing

Mix Ratio – It is absolutely essential that the mix ratio of the two components is accurately measured and maintained to within 1% of the specified value. This ensures that the chemical reaction will proceed to completion and that the optimum physical properties are achieved. We highly recommend that calibration of mix ratio is conducted daily before production commences to ensure that the correct ratio is being maintained.

Please note: The reactivity of the system will not be altered if the level of one component is increased/decreased as it is not simply a catalyst. If you want to adjust the reactivity or mix ratio please discuss your specific requirements with our technical consultants.

High Pressure Machines – High pressure machines rely on high pressure impingement mixing of the two components in the mix head. We recommend that the pressures be set at 150 bar as a starting point and then vary the pressures to suit individual processes and requirements. If there is a “sticky” spot of material in the area of pour then this is most likely cause by a “lead” or “lag”. This is when one of the two components is dispensed slightly before the other and remains un-reacted. It generally requires the pressures of the two components to be balanced. High pressure machines are the most preferred method of dispensing polyurethanes as they produce the most efficient mixing of the components and they also do not require a solvent flush after dispensing.

Low Pressure Machines – Low pressure machines dispense the two components at a controlled ratio through a mechanically driven mix head. It is essential with foams that a small amount of nucleating air is added to the liquid components as they are dispensed to attain a fine even cell structure. The machine will then clean the residual reacting components out of the mix head with a solvent flush. We can supply UrePac+ 7112 which is a non flammable and non toxic solvent suitable for flushing of low pressure mix heads.

Hand Mix – When small production runs are required it is perfectly acceptable to hand mix the two components to achieve the final product. We recommend that a clean dry vessel twice the volume of the liquid is used to enable sufficient mixing of the components. Please follow the following method:

- Accurately weigh the Polyol component into clean dry mixing vessel. For a 0-5kg mix, a scale that can measure within an accuracy of 0.1 - 1 gram should be used.
- Into the same container quickly but accurately weigh the correct weight of isocyanate component.
- Mix the liquids together using a jiffy type paint mixer with a high torque 240V drill (not a battery powered cordless drill) at about 2000-2500rpm.
- Continue mixing for about 30-45 seconds until a homogeneous blend of the two liquids is achieved.
- Pour the liquid evenly into the mould cavity and securely close the mould. This process must be completed prior to the foam beginning to rise to prevent voiding in the foam.
- Clean the mixer and bucket with UrePac+ 7102. Wait until the appropriate demould time before opening the mould to ensure complete cure.

Demould

The demould times of foam can vary considerably depending on a number of factors and is the optimal time is usually determined by systematic trial and error. The thickness of the part, mould temperatures, mixing method, level of overpack and the reactivity of the system will all affect the time required to achieve sufficient cure. If the foam is not sufficiently cured then the parts will expand after demould and may also have internal splitting as the core of the part is not sufficiently cured to handle the release of pressure.

Clean Up

It is essential that any liquid spills are cleaned up immediately, as the isocyanate (which reacts with atmospheric moisture) and reacting urethane is very difficult to remove once it has fully cured. For liquid spills we recommend using UrePac+7102 which is a non flammable, quick drying solvent. For cleaning of cured urethane from small utensils we recommend using UrePac+ 7108 heated to 70°C in a deep fryer for 1-2 hours.

Safety Requirements:

PPSE

We recommend the use of eye protection and latex or nitrile gloves when processing any polyurethane systems. We would also recommend the use of disposable overalls as splashing of the isocyanate can cause temporary staining of the skin, and some individuals can become sensitized to isocyanates with skin contact. In normal use the isocyanates will generally remain below the allowable exposure limits, however if they are heated or dispensed as an aerosol into the atmosphere then a respirator with organic vapour filter is essential.

Transport (Dangerous Goods) Classification

Component A: None

Component B: None

Isocyanates

Classified as Hazardous according to Worksafe Australia

HARMFUL VAPOUR

SKIN AND EYE IRRITANT

SKIN AND RESPIRATORY SENSITISER

FIRST AID

If inhaled: remove from exposure. For all but the most minor symptoms arrange for a doctor or transport to the nearest hospital.

In case of eye contact: immediately flush eyes with plenty of water for at least 15 minutes. Contact medical attention.

In case of skin contact: immediately wash skin with soap and plenty of water. Get medical attention immediately if symptoms occur. Remove contaminated clothing Wash clothes before re-use.

Other information: Never give fluids or induce vomiting

Advice to Doctor: May cause respiratory sensitisation or asthma-like symptoms. Bronchodilators, expectorants and anti tussives may be of help. Respiratory Symptoms, including pulmonary oedema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. No specific antidote. Treatment based on judgement of the physician in response to reactions of the patient.

WATER CONTAMINATION CAUSES DANGEROUS PRESSURE

Store in a DRY place. The combined evolution of CO_2 and heat can produce sufficient pressure to rupture a closed container.

IN CASE OF FIRE: use CO_2, dry chemical or foam extinguishers. If water is used it should be in very LARGE quantity. The reaction between water and hot isocyanate may be vigorous. Wear a positive pressure self-contained breathing apparatus.

IN CASE OF SPILL OR LEAK: evacuate and ventilate spill area. Do not use water. Dyke to prevent entry into waterways. If temporary control of isocyanate vapour is required, a blanket of foam may be placed over the spill. Use appropriate safety equipment including respiratory protection during clean up. Soak up with sawdust or other absorbent. Shovel into suitable open-top containers. Do not make pressure tight.

Remove from the area for decontamination. Use a solution of 3-8% ammonia in water or 5-10% sodium carbonate at about a 10 to 1 ratio to isocyanate. Detergent may be added to facilitate wetting of ammonia solution. Let stand 1-2 days before disposal in approved manner.

EMERGENCY RESPONSE (All Hours)

1800 033 882 (Australia Only)

Disposal

Liquid Systems: Liquid polyurethanes should be disposed of with an EPA approved industrial waste company which meet all applicable federal, state and local laws and regulations.

Cured Urethanes: Fully reacted and cured polyurethanes are inert and can be disposed of as normal landfill.

Container: Dispose of decontaminated drums in accordance with all applicable federal, state and local laws and regulations.

Do Not Re-use Empty Container.

Do Not Cut or Weld Empty Container.

Disclaimer

This information is given in good faith but without warranty and is supplied to users based on our general experience and, where applicable, on the results of tests on samples of typical manufacture.

However, because of the many factors which are outside our knowledge and control that can affect the use of these products, it is imperative that the end user is satisfied that the material will meet their individual processing and performance requirements. Pacific Urethanes Pty Ltd cannot accept liability for any injury, loss or damage resulting from reliance upon this information.

All sales of this product shall be subject to Pacific Urethanes' Terms and Conditions of Sale. For a copy of these terms please contact us at info@pacificurethanes.com .

For additional information, consult the Material Safety Data Sheet for this product.