



NUKOTE AEGIS™ PROTECTION SYSTEM

NUKOTE AEGIS™ RESTORATION SYSTEM

*Protective Coating Systems for
Manholes, Wetwells, and Other
Concrete and Masonry Structures*



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1. ABOUT NUKOTE COATING SYSTEMS



NUKOTE COATING SYSTEMS INTERNATIONAL

Nukote Coating Systems International is a U.S. limited liability company owned by GCI Holdings LLC and MSO Holdings LLC. The company was formed to be the first truly global entity to spread and promote solutions based on fast set thick film elastomer coatings technology, including polyurea, polyurethane and hybrids of the two chemistries. NCSI set out in 1996 to promote this business globally initiating international business in Mainland China, continuing to India, Middle East, Australia, Russia & Former Soviet Union countries, Asia pacific as well as Africa and Europe resulting in operational entities in Australia, China, India, Saudi Arabia and the European Union.



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GLOBAL BUSINESS UNITS

AFRICA OPERATIONS

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AUSTRALASIA OPERATIONS

Nukote Industries Pte Ltd
Ho Chi Minh (Vietnam), Bangkok (Thailand), Kuala Lumpur (Malaysia), Jakarta (Indonesia), Manila (Philippines).
Nukote Distributors Pty., Ltd
New Castle NSW Australia and Perth WA Australia
Nukote China Ltd
Wuhan, Shanghai, Hong Kong and Beijing

INDIA OPERATIONS

Nukote India Pvt Ltd
Mumbai and Bangalore India

MIDDLE EAST OPERATIONS

Nukote Arabia Ltd
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NORTH AMERICAN OPERATIONS

Nukote Canada Ltd
Toronto, Nova Scotia, Edmonton, Vancouver
Nukote USA LLC
Dallas Texas and Los Angeles California
Nukote Mexico Ltd
Mexico City, Mexico

SOUTH AMERICAN OPERATIONS

Nukote Latin America Ltd
Sao Paulo, Brazil
Nukote Brazil Ltd
Bella Horizonte, Brazil



NUKOTE COATING SYSTEMS

Nukote Coating Systems International as the parent company of all global operations maintains its international headquarters offshore in close proximity to all expanding markets. Originally this location was Shanghai China (1998-2004) followed by Dubai (2004-2008) and now Singapore. We maintain corporate technical, business development and financial personnel in Singapore supporting all global operations.

NCSI is not an application firm but a manufacturer, with strong application and specification capabilities. Our role is to develop, test and specify products designed for specific application types, thus our product line of 70+ specific formulations designed to meet the needs of specific application requirements. We are also involved in the QA/ITP procedures and compliance, and ensure that products manufactured in all global locations are identical regardless of origin.

Nukote coating solutions are technology breakthrough solutions that surpassed conventional coating systems in all aspects of performance, speed, and durability. NCSI relies on a network of industry professionals to deliver maximum value to its customers and aims through its pool of experience to be the leading solution provider for the following market segments:

Waterproofing & Anti-Corrosion (Concrete & Steel Substrates)

Primary Containment	Tanks & Reservoirs	Tunnels
Secondary Containment	Artificial Lakes & Ponds	Roofing Systems
Infra Structures	Natural Habitat	Dams & Canals
Wet Areas	Bridges & Bridge Decks	Marine Structures & Piles
Subgrade Structures	Planetariums	Water and Waste water

Pipe Lines

Insulated Composites	Oil & Gas	Potable Water
Waste Water	District Cooling	Specialty Applications

Decorative Finishes

Facades	Stadia	Floors & Offices
Amusement & Theme Parks	Statues & Models	Sea aquariums

Specialty Applications

Class 1 Fire Rated Systems Automated OEM Systems Insitu Pipe Restorations

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2. INTRODUCTION TO NUKOTE PRODUCTS



Nukote Products Key Features and Benefits

- Fast Reaction Time (sets between 5 and 15 Seconds),
- Eliminates delay and assists faster project execution
- Moisture and Temperature Insensitivity.
- Low Water absorption,
- Low Perm rating and Water vapour transmission
- Monolithic and Seamless Application
- Excellent Adhesion and Abrasion Resistance.
- Good Tensile Strength.
- Good Impact Resistance
- High Elongation.
- Superior Tear Resistance (>108 KN/m)
- Heat & Fire Resistance (UBC – Class1).
- Long Term Stability & Chemical Resistance.
- No V.O.C, Environmental Friendly.

Fast Reaction Time

Nukote products fast reaction time (5-15 seconds) is faster than any competing coating product. With the fast reaction time, Polyureas do not easily react with humidity and moisture in substrates, so the material can be readily applied over cold or damp substrates, such as steel, concrete, wood or PU foam. Fast reaction time is a great advantage of polyurea. In the case of facility maintenance or rejuvenation, owners want to regain usage of the facility as soon as possible. Coated areas can be open for light trade use within an hour and put to full use within twelve hours. Other coating products used can take weeks to apply and cure.

Moisture and Temperature Insensitivity

Where moisture or humidity is a concern, polyureas outperform any product on the market today. Most coatings are sensitive to high humidity and moisture in a substrate. As a result, they will react with atmospheric moisture or high humidity to produce carbon dioxide gas and cause foaming or pin holing in the surface. In contrast, polyureas are not affected by moisture. Nukote polyurea can also be applied at virtually any temperature without problem or complication.

Seamless Application

Nukote polyurea chemically bonds to itself producing a monolithic or seamless coating membrane. Coating applications typically fail at seams. Without seams, there is nowhere for fluids, bacteria, or other contaminants to pool and penetrate.



Excellent Adhesion

An industrial protective coating will only perform as well as its ability to adhere to the substrate requiring protection. Nukote polyureas adhesion tests dramatically outperform other traditional coating products. In most cases the adhesion failures in the tests are due to the testing equipment and not to the polyurea. If a substrate is moist or has condensation on it, polyurea will perform much better than competing products. A properly prepared surface will improve adhesion, especially for critical applications such as moist concrete for containment lining and flooring, as well as adhesion protection for geotextile, wood and steel.

High Abrasion Resistance

In a highly abrasive environment, polyureas perform extremely well. They are used because of their superior elongation and high impact resistance. Epoxies and other coating options will crack and delaminate when exposed to constant pounding. The resistance to puncture, tearing, and abrasion make it ideal for abrasion applications like storing and transporting products including coal, nuclear waste, garbage, and other similar products, including particulate heavy liquids.

Superior Elongation and Tensile Strength

In waterproofing applications, a low modulus and a high elongation elastomer are required to meet the challenge. Modern advances in the chemistry mean polyureas are formulated to feel as soft and elastic as polyurethane. The new polyureas will stretch with much less force. And, more importantly, polyureas will vigorously resist punctures and tears. These attribute makes Nukote polyurea ideal for any application where there will be some shifting to the substrate. Tunnels and concrete tanks for example shift and settle with the Earth's movement as is the case when exposed to explosions. Nukote Polyureas excellent elongation and tensile strength allow it to bridge cracks and gaps in the substrate preventing failures.

Method of Application

The material is applied using plural spray proportioning equipment giving production rates in excess of 1000 m² per day for polyurea spraying, while achieving high builds in single applications due to the fast setting time of the product. In this specific case due to height of works and heavy DFT builds we expect production rates of 250 square meters per day.

Installations

Regional applications are carried out by certified applicators with the proper training, experience and professionalism required to apply our products. Our products are molecular plastic coatings as well high end coatings which require equipment systems that are both expensive and highly productive.

A List of firms qualified to apply our products in each region is available and all contracts are executed through the regional trained and approved contracting entities.



Long-Term Stability

The polyurea products recommended here are based on aromatic isocyanate pre-polymers that are highly weather resistant and UV stable. End-users could safely choose a polyurea for applications that would be constantly exposed to sunlight, without fear of degradation of the physical properties. Tests have shown that after the equivalent of 10 years exposure to UV cycles, polyurea coatings exhibit a high percentage of original physical properties, usually greater than 85%. This is much higher than alternative solutions.

If colour stability is a pre-requisite of the end-user then an aliphatic isocyanate pre-polymer can be specified that will provide the desired level of colour stability. In this particular case, it is believed that this is not desired and as a consequence has not been recommended.

Environmental Protection

Exposed polyurea is widely used in applications such as concrete or geo-textile coatings for secondary containment applications. Polyureas' fast cure times allow it to be rapidly applied to a prepared substrate with minimal downtime for the facility. This has made polyurea the choice of facility managers for walls around and floors under chemical storage of diluted acids, alkali, salt solution, organic solvents and oils.

Polyurea provides a strong barrier to spills from reaching the environment. In this type of application, polyurea readily conforms to footings, pipes and protrusions to form a complete seal. Nukote is extremely concerned about the welfare of the people and the country in which we operate. Nukote polyurea is not harmful and does not pollute the environment through its production, storage, transportation, application, or disposal. It is designed to protect the environment and is frequently used in that manner.

Insurance Backed Warranties from Nukote

Nukote Coating Systems provides 100% warranties for both material and application (supply and apply). In addition, Nukote backs up this warranty with a full insurance backing for their projects with blanket coverage of 5 million Euros. This warranty and insurance backing is unique to the industry and provides 100% confidence that the products will perform for the life of the project as designed.

www.nukote.com.sg, www.ncs-intl.net, www.nukote-asia.com
www.nukotecoatings.com.au



3. ADVANCED POLYMER FEATURES & BENEFITS

POLYUREA FEATURES AND APPLICATIONS

The following document is a prepared summary of some of the uses for Nukote polyurea in the petrochemical industry, the power generation industry, Water and Waste water, Construction, Industrial and military applications. This summary is in no way exhaustive, and is meant only as a guide for some potential applications.

Nukote Polyurea

Nukote polyurea has a number of advantages including:

- Seamless Application.
- Heat & Fire Resistance (UBC – Class2).
- Long Term Stability
- Chemical Resistance.
- 100% solids, No V.O.C, Environmental friendly
- Excellent retention of Physical properties even on ageing. (>90%)
- Fast Reaction Time (sets between 5 and 15 Seconds).
- Eliminates delay and assists faster project execution.
- Minimum downtime in new construction
- Moisture and Temperature Insensitivity. (-30 Deg C to +150 Deg C)
- Monolithic and Seamless Application, eliminates the potential failure points
- Excellent Adhesion and Abrasion Resistance.
- Suitable for heavy wear and tear
- Superior Tensile Strength (>20 MPA).
- Impact Resistance (> 10J)
- High Elongation (>100 %).
- High puncture resistance
- Superior Tear Resistance (>80 KN/m)
- Heat & Fire Resistance (UBC – Class2).
- Long Term Stability & Chemical Resistance.
- Very low absorption < 1%
- Excellent PERM rating-- 0.02 Us Perms.

A final advantage with respects to some coatings is cost. There are many applications where using Nukote polyurea is not only cost competitive by cost effective. Basically, Nukote polyurea is a good option where one of these above advantages makes it a better option than coatings currently being used. The following is a brief description of each point and how it is an advantage to your customers:

POLYUREA FEATURES AND APPLICATIONS

Fast Reaction Time—Nukote polyurea's fast reaction time (5-15 seconds) is faster than any competing coating product. With the fast reaction time, Polyurea do not easily react with humidity and moisture in substrates, so the material can be readily applied over cold or damp substrates, such as steel, concrete, wood or PU foam. Fast reaction time is a great advantage of polyurea. In the case of facility maintenance or rejuvenation, owners want to regain usage of the facility as soon as possible. Polyurea was the chosen coating product for the Dallas

Fort worth airport, one of the world's largest airports, remodel because walkways, car parks, and runways that were coated during the night were fully available for use the following morning. Actually, coated areas can be open for light trade use within an hour and put to full use within twelve hours. Other coating products used can take weeks to apply and cure. As discussed later, you will see how this is a great advantage for many applications, including military where remote bases need to be set up in a matter of days and hours not weeks and months.

Moisture and Temperature Insensitivity—where moisture or humidity is a concern, polyurea outperform any product on the market today. Most coatings are sensitive to high humidity and moisture in a substrate. As a result, they will react with atmospheric moisture or high humidity to produce carbon dioxide gas and cause foaming or pin holing in the surface. In contrast, polyurea are not affected by moisture. Nukote polyurea can also be applied at

Virtually at any temperature without problem or complication. Countries with big terrain and diverse climate require a versatile coating product that can be used in any location regardless of weather. When designed as a national standard for maintenance for railroads, crews can be trained and dispatched around the country knowing their coating product will not fail due to atmospheric conditions.

Excellent Adhesion: An industrial protective coating will only perform as well as its ability to adhere to the substrate requiring protection. Nukote polyurea's adhesion tests, despite substrate and conditions out dramatically perform other traditional coating products. In most cases the adhesion failures in the tests are to the testing equipment and not to the polyurea. If a substrate is moist or has condensation on it, polyurea will perform much better than competing products. A properly prepared surface will improve adhesion, especially for critical applications such as moist concrete for containment lining and flooring, as well as adhesion protection for geotextile, wood and steel.

Superior Elongation and Tensile Strength: In waterproofing applications, a low modulus and a high elongation elastomer are required to meet the challenge. Modern advances in the chemistry mean polyurea are formulated to feel as soft and elastic as polyurethane. The new polyurea will stretch with much less force. And, more importantly, polyurea will vigorously resist punctures and tears. These attribute makes Nukote polyurea ideal for any application where there will be some shifting to the substrate.

POLYUREA FEATURES AND APPLICATIONS

Tunnels and concrete tanks for example shift and settle with the Earth's movement. Nukote polyurea's excellent elongation and tensile strength allow it to bridge cracks and gaps in the substrate preventing failures.

Low to No Volatile Content: Many local and state government agencies are cracking down on styrene emissions. Unlike polyester fiberglass or epoxy, no fumes or styrene emission are associated with polyurea. Therefore, polyurea is ideal for applications such as wall and floor coatings for the food and beverage industries. Many manufacturers in the marine, bath fixture and recreational vehicle industry can also turn to polyurea as a reliable, cost effective alternative for both coating and molding. The low volatile content of polyurea also makes it very attractive for confined workspaces. Due to the low VOC, Nukote polyurea can be used with potable water, food preparation or medical applications.

High Abrasion Resistance: In a highly abrasive environment, polyurea perform extremely well. In the rail and barge industry, polyurea are used because of their superior elongation and high impact resistance. Epoxies and other coating options will crack and delaminate when exposed to constant pounding. The durability and physical properties of polyurea have made it the system of choice for the rapidly growing truck bed lining industry for both commercial and personal trucks.

Polyurea is sprayed in a uniform texture over the metal bed surface doubling the truck bed's life. The resistance to puncture, tearing, and abrasion make it ideal for abrasion applications like storing and transporting products including coal, nuclear waste, garbage, and other similar products.

Seamless Application—Nukote polyurea chemically bonds to itself producing a monolithic or seamless coating membrane. Coating applications typically fail at seams. Without seams, there is nowhere for fluids, bacteria, or other contaminants to pool and penetrate.

Heat and Fire Resistance: When it comes to heat resistance and fire retardant, polyurea have the advantage over many other coating options. Nukote Has developed and patented a new version of Fire Retardant Polyurea which opens unlimited application opportunities. Because of its formulation, structural/rigid polyurea have excellent resistance to heat distortion and sagging. At the same time, polyurea maintains its flexibility and high impact resistance. Polyurea resist heat sag and maintain their shape. In the case of fire, polyurea will naturally outperform most other polymer resins.

The resulting low smoke and flame spread is due to polyurea's' molecular structure. Exposed to constant flame for 20-30 seconds, polyurea will self-extinguish. Standard Nukote polyurea is not fire proof. However, we do have some R&D products that are fireproof. These products are designed for roofs and other similar applications.

POLYUREA FEATURES AND APPLICATIONS

Long-Term Stability: Some polyurea are based on aliphatic isocyanate pre polymers that are highly weather resistant and color stable. End-users could safely choose a polyurea for applications that would be constantly exposed to sunlight, without fear of discoloration or chalking. A standard Nukote warranty is 20 years, but we have given warranties for 50 years on some applications.

Environmental Protection—Exposed polyurea is widely used in applications such as concrete or geotextile coatings for secondary containment applications. Polyurea’s fast cure times allow it to be rapidly applied to a prepared substrate with minimal downtime for the facility. This has made polyurea the choice of facility managers for walls around and floors under chemical storage of diluted acids, alkali, salt solution, organic solvents and oils. Polyurea provides a strong barrier to spills from reaching the environment. In this type of application, polyurea readily conforms to footings, pipes and protrusions to form a complete seal. Nukote is extremely concerned about the welfare of the people and the country in which we operate. Nukote polyurea is not harmful and does not pollute in its production, storage, transportation, application, or disposal. It is designed to protect the environment and is frequently used in that manner.

Price—While Nukote polyurea is more expensive than many coatings on a liter by liter basis, it is extremely cost effective when a comprehensive cost-benefit analysis is performed. Nukote polyurea reduces downtime, and extends expected life of projects and equipment, both of which dramatically increase the coatings value. In the case of pipelines, Nukote polyurea saves millions of dollars because the pipe can be coated in a mobile coating facility preventing the need to transport the pipe from the mill to the coating facility to the right of way (ROW) where the pipe is installed. Likewise, the field joints cost a tenth of existing coating products. There are also a number of high-end coatings for which Nukote polyurea is an ideal substitute. In these cases, Nukote polyurea is less expensive on a liter by liter basis as well as a comprehensive cost-benefit analysis.

In a world of increasing environmental awareness, polyurea proves to be an effective and economical choice for governments and businesses for their elastomeric and structural needs. Material improvements in cure times, hardness physical properties, and chemical resistance are being made every day. Application equipment and spray tip innovations are being introduced more rapidly than ever to meet the demand for better, more efficient means of getting the product sprayed in place.

Universal Applications

There are a number of applications for which Nukote polyurea is ideal regardless of industry. Most industries have a need for protective coatings. Their roofs, floors, workshops, warehouses, cafeterias, bathrooms, and offices all need to be coated with something.

POLYUREA FEATURES AND APPLICATIONS

Many of these industries also have trucks or other equipment where a protective coating that doubles the expected life of the equipment is a great advantage. The industries have waste and potable water systems, pipes, processing plants, and tanks. They also have roads and other infrastructure related applications. Gardens, ponds, fountains, and the like are present in almost any industry. These universal applications are not industry specific. Nukote polyurea will perform just as well on a roof of a power product facility as it will on the roof of a military base or hospital. For these universal applications, you need to tour the facility, or look at the plans. Look for large areas that will logically require coating, and then find out from the engineers or designers what coatings have been used in the past and what their greatest weaknesses are. Ask them the expected performance life of their existing coating. Ask about the cost of replacing it after its useful life. Ask them what problems they would like to have their coating solve? Based on this information you can prepare a proposal for them to evaluate. We have found it is best to have them first read a general introduction and proposal, and then show them a physical demonstration of the product's application. Without fail after an engineer or designer sees Nukote polyurea sprayed they immediately start to see new applications where it can be used. At that point, the material starts to sell itself. Aside from Universal Applications, there are a number of industry specific applications. Some of these possible industrial applications are outlined below.

Petrochemical Industry

Clearly the largest coating need in the petrochemical industry is pipelines. Nukote polyurea is the only polyurea in the world that has been used on pipelines for multinational petrochemical companies.

Pipelines—Nukote Coating Systems has prepared a comprehensive analysis of pipeline coatings and an introductory tri-fold brochure for Nukote polyurea applications in the oil and gas industry. If you have not received these documents and are interested, please request them via email at scbean@nukote-asia.com. Briefly, the benefits for pipelines are as follows:

Higher physical properties	Better return on investment
Seamless membrane	Instant in-service time
Tested in all climates	Above or below grade
Easily transported and installed	Fresh or salt water submersion
Automated lathe application	Cold bends
Decades of industry use	Simple field joining and repair
Multinational project experience	In-field application
Resists damage during transport	Quality in field is equivalent to factory coatings

Pipelines are ideal applications because they have large surface areas and because they are coated in a controlled environment, so production speeds are easy to calculate and manage.

POLYUREA FEATURES AND APPLICATIONS

Primary containment—petrochemical facilities have large tank farms to store their products during the processing and transportation process. In all cases, Nukote polyurea is ideal for use for external corrosion protection. In many applications, Nukote polyurea can be used for internal anticorrosion coatings as well.

Secondary containment—domestic and international laws require the tank farms described above to have secondary containment to protect the environment from leaks in the primary containment. In addition to protecting the environment, proper secondary containment also allows the owner to reclaim spilled material. Nukote polyurea sprayed over our geotextile fabric is an ideal solution, and in most cases reduces the need for concrete as a foundation. Nukote polyurea can also be applied directly over concrete without the geotextile fabric still providing the same seamless, rigorous coating.

Transportation—petrochemical products require large fleets of equipment for transportation. One of the largest coating applications we are currently working on is ballast tanks for oil tankers. The ballast tanks are large tanks where water is pumped in and out to improve the ships drag. Sea water is very corrosive and these tanks require a durable coating product. Likewise the decks and other areas on the boats experience prolonged exposure to harsh elements especially sea water. Tanker trucks, ports, and other transportation related facilities all require outstanding anticorrosion coating. Nukote polyurea is ideal for these applications.

Power Generation—Power generation plants are large facilities and consequently have a number of applications that would fall under the “universal applications” described above. There are, however, a number of industry specific applications that should be considered. These applications are based on the type of power generation facility.

Coal-fire—these operations have a number of coating applications. The primary application is the tanks for the cooling system. These include steel, above-ground tanks that need internal and external coating and concrete, below-ground tanks that need internal coating running to and from these tanks are a number of pipes that require internal and external coating. Part of the cooling system also includes large pools below the cooling towers. The water used for the cooling system is often brought to the facility via pipes or canals, both of which need to be coated.

The coal transportation system has a number of opportunities for coating. Coating the inside of freight cars and trucks reduces carryback, which is the amount of coal that is left in the car or truck after dumping. A 10% carryback makes 1 in 10 trips a waste. Also, the conveyer belts can be coated to extend their useful life. Currently, in most plants the coal is kept in large mounds directly on the ground with little to no containment for rainwater that soaks through the coal and then leeches into the ground killing plant and wildlife. Nukote polyurea will solve this problem. The coal moving equipment front-end loaders all can be coated to reduce carryback, corrosion, and abrasion.

POLYUREA FEATURES AND APPLICATIONS

Nukote polyurea is a good option for internal external liners for smoke stacks. It performs well to coat the top half of the interior, but at this time we only have an R&D product to coat the bottom half of the smoke stack.

Nuclear: Nukote polyurea is not an ideal sole coating for nuclear waste or for nuclear reactors. However, it is an excellent coating for secondary containment. It also works well as a protective coating for transportation equipment. Trucks used to haul contaminated soil can have their bed liner removed saving the trouble and cost associated with replacing the entire bed. When applied over a Nukote geotextile fabric it provides an excellent secondary containment barrier, especially for storage of radioactive dirt and other byproducts. Other systems used in coal-fired plants can also be used in nuclear plants.

Hydro—The largest application potential with hydroelectric power generation facilities is the water delivery system. Often the water is brought to the facility via canals or pipes. Currently, NCS is bidding on restoration projects for two large water delivery canals for power generation facilities in the Middles East and South East Asia. Dams also provide a good surface area to coat. There are a number of other applications, which hydroelectric engineers will be able identify.

Military-----Nukote polyurea is used by military branches around the world. Other than the standard industrial applications for which the military also has needs, there are many military specific applications. Right now, its most promising application is shrapnel prevention. Tests show a wall coated with polyurea is dramatically more resistant to shrapnel as opposed to other coating options.

As a specific example a normal red brick can be coated with polyurea and dropped 5-minutes later from a five-story building. From the outside the brick looks whole. On the inside the brick is completely destroyed. Polyurea cannot stop the brick, wood, concrete or glass from being destroyed, but it can reduce or prevent the shrapnel, which is the primary cause of death when buildings are bombed.

Using Nukote polyurea, a temporary bunker could be built with brick or cinder block and then coated. This facility would be easy to camouflage, easy to maintain and resistant to shrapnel. It is also an ideal coating for ammunition storage facilities and other below grade buildings.

The US Air Force required a fast runway repair material for use in remote air bases that need to be set up and repaired quickly. Likewise, the speed with which Nukote polyurea is applied and can be put to use make it ideal for mobile operation points.

Nukote polyurea has been used for industrial and military helicopter landing pads. It has been used to coat the decks of ships and submarines as well.

POLYUREA FEATURES AND APPLICATIONS

Mining-----The largest need for coating in the mining industry is in the material handling. The equipment and conveyor systems require extensive abrasion and corrosion resistance. One mine has specified Nukote polyurea as a protective liner of their large million-dollar dump trucks. Coating the bed prior to putting into service more than doubles the expected life of the bed. These coatings are also easy to repair. In addition to the abrasion and corrosion resistance, Nukote polyurea also reduces carryback as explained above. Nukote polyurea also works well for coating retaining walls to prevent erosion. Mining operations also require large secondary containment applications to protect the environment from toxic byproducts seeping into the ground water.

Public Works----The uses of Nukote polyurea in public works projects are extremely diverse; some of the primary applications include the following:

Wastewater treatment—Wastewater treatment is a huge need for large cities with millions of people generating waste water on a daily basis. Due to this load most systems are being used at or beyond capacity. However, much of the water processed through wastewater treatment facilities is clean ground water that entered the system through leaks in the pipes or manholes. In fact, industry experts believe up to 30% of the unnecessary groundwater infiltration and inflow is due to leaks in manholes. Consequently, more and more municipalities are addressing the corrosion in wastewater treatment systems and the related health and environmental challenges by paying increased attention to rehabilitating corroded manholes. Once seen as secondary to mainline pipe repair, manhole rehabilitation is now recognized as essential to restoring a collection system's overall integrity.

Clearly, both manhole and mainline pipe repair are both important, but repairing manholes is a relatively easy and quick repair that will have a substantial impact on the treatment system. And, unlike mainline repair the system can be repaired without affecting the system's continuous use. The treatment plants and other systems related to processing wastewater provide an extremely large application potential for Nukote polyurea.

Land Fills, Waste collection and deposit—waste receptacle trucks require extremely durable anti abrasion and corrosion protective coatings. Likewise, landfills need a protective industrial coating that is easy and affordable to install and performs extremely well. For landfills, we recommend using polyurea on geotextile fabric directly over dirt. This system provides a better system than using concrete and it is dramatically more cost effective.

Bridges and tunnels—Nukote Coating Systems' chief chemical engineer designed the polyurea systems used on the two largest polyurea coating projects in the States, the San Mateo Bridge and the Boston Tunnel. Nukote polyurea is an ideal coating product for any, or all, of the bridges and tunnels that require superior industrial coatings.



POLYUREA FEATURES AND APPLICATIONS

Ports, wharfs, and harbor development—Nukote polyurea is also ideal for ports, wharfs, and harbor development. Nukote polyurea’s ability to withstand both long-term salt water exposure and marine borers makes it an ideal coating for pilings, docks, and other applications. Its ability to withstand high abrasion caused by chains and ships is also a benefit.

Conclusion

The applications mentioned above are just some of the industries and some of the applications in those industries. Engineers who are intimately familiar with the coating needs of their specific industry will be able to better identify other coating needs.

Why Nukote HLT works and sodium silicates (and other look a likes) don't

All look-alike products do not perform alike even though they are making similar claims.

How can you make sure which one to believe! We will explain in the following paragraphs how our product, Nukote HLT, a colloidal silicate, is different from the current popular sealers on the market (which are sodium silicates).



Nukote HLT acts differently because it is different and that's why is able to penetrate more than 6 inches when the look-a-likes can only sit on the surface.

About Silicates

Silicates are plentiful in nature, constituting the greater number of the minerals that compose the crust of the Earth. They are compounds containing silicon (next to oxygen, Earth's most abundant element) with oxygen and a metal. Man-made silicates are used for a wide variety of purposes, from glass making to water treatment, plus the major ingredients of Portland cement are silicates.

Silicate materials are used as waterproofing agents in concrete because of their solubility in water. The waterproofing concept ideally is: water soluble silicates contact and react with certain common ingredients which are always available inside Portland cement concrete (such as one or all of the available hydroxide materials, soluble calcium compounds or free and unused alkalis) to form insoluble precipitates. This process allows the Nukote HLT to increase the density of concrete and waterproof the concrete at the same time with a single application.

The fact is, with the exception of the Nukote HLT, most, if not all, silicate products formulated and marketed to date, begin to react with the ever present calcium hydroxide residue immediately upon contact with the concrete's surface. This generates a thixotropic, sparsely distributed crystalline precipitate gel, which very much hinders or prevents further silicate solution penetration.

The resultant hydroxide precipitated gel is not of uniform composition. It consists of variable-sized pores, ranging from very small to very large. This causes the precipitate to only be temporary at best. As water migrates through the gel's larger pores, the gel erodes and eventually will fail. How quick will depend on the volume of water and its driving force passing through the concrete?

NUKOTE HLT



The silicate solution's immediate surface reaction can also cause ineffective, incomplete thixotropic gel to be generated. Since the reaction begins immediately upon contact with the concrete's surface, there is a tendency for there to be more silicate solution available in the application than there is hydroxide material in the concrete to react with.

This causes varying portions of the thixotropic gel deposited inside the concrete to not be completely reacted, becoming what is considered an incomplete gel. Incomplete gel contains reaction sites that remain available for reactions. These unfulfilled reaction sites will eventually react with atmospheric carbon dioxide and form carbonates. The carbonates then can eventually migrate to the surface and cause damage to the concrete that it was meant to protect.

There are some silicate solutions, such as Nukote HLT, that are able to penetrate very deeply into concrete and form precipitate, a gel-like compound, in the pores upon contact with the always present free unused alkalis. However, type and uniformity of this internally produced compound can vary greatly, and can be the most important factor as to whether the silicate solution became beneficial to concrete or not, and to what degree. Unlike Nukote HLT, some silicate products form gel that will absorb internal moisture and begin swelling and continue swelling whenever moisture becomes available. This can produce extreme internal pressures and stresses, even to a point where concrete's integrity could be damaged quite severely (similar to an alkali-aggregate reaction).

Nukote HLT is successful in overcoming such problems and is a superior product very beneficial to concrete. Since Nukote HLT goes into concrete as a unique precision-blended colloidal liquid, its internally generated compound or precipitate, is designed to be very superior when compared to other existing look-alike products. The precipitate packing density is very precise and creates pore networks of extremely uniform-sized porosity with pore sizes smaller than a molecule of water, or free moisture.

As Nukote HLT precipitate is being formed, it involves special ingredients to cause polymer cross linking and branching, encouraging polymer particle and strand connection. It creates extraordinarily strong polymer chains, which provide the extra strength and durability to truly become permanent and insoluble. Furthermore, the polymer chain and pore configuration cause Nukote HLT gel compound's residual water or free moisture to remain in a stretched position with a density similar to that of ice. Should a hard freeze occur, this water or moisture does not expand further to cause freeze-thaw cycle damage, as does the gel compounds of some look-alike products. Look-alike products, making similar claims, usually only form shallow, weakly linked short chain gel polymer compounds. They may or may not hold up for an appreciable length of time. They are entirely dependent on the harshness of the concrete installation's surrounding environment. Plus, there is always the possibility that incomplete gel may migrate back to the surface, creating surface traction problems in products other than Nukote HLT.

NUKOTE HLT



Sodium silicate formulas have been around since the early 1950's, and was originally used as a concrete floor hardener. Since it is a sodium silicate formula it would form a thixotropic weakly-linked crystalline structured gel in and just beneath the large surface porosity of concrete. This sodium silicate product has large normal-sized sodium silicate molecules that would cause it to be unable to penetrate past concrete's surface porosity bottom. Also, it begins to gel as soon as it contacts concrete. This is because it is activated by available hydroxides of concrete.

So without spreading (broom) and diluting with water, in attempting to make it penetrate, it still probably doesn't penetrate more than 2mm, and most likely will not anyway, unless the treated concrete is extremely porous. Sodium silicate solutions have a place in the concrete treatment arena. However, their role should only be limited as surface hardeners. Sodium silicate solutions historically perform very poorly and ineffective as sealers since they react with any and/or all of the hydroxides associated with concrete. Some of these hydroxides are calcium, magnesium and potassium.

Since sodium silicates, contact one or more hydroxides immediately upon coming into contact with Portland cement concrete their depth of penetration is severely limited due to the immediate formation of an incompletely transformed (thixotropic) gel. Plus this solution is unable to pass through its own self.

Due to the created thixotropic incompletely transformed gel mass carbon dioxide becomes more prolifically absorbed from the atmosphere into the incomplete gel. This eventually forms carbonates which promote carbonization that may detrimentally affect the surface integrity of the concrete it was supposed to help.

Since Nukote HLT is an especially-blended colloidal silicate, and not a sodium silicate, its molecule sizes are very tiny, plus their molecular size is even controlled while penetrating concrete. Nukote HLT's internal reactions are activated by concrete's free alkali and/or alkaline hydrates.

Nukote HLT initially encounters free alkali between surface porosity and concrete's matrix component; this is also the transition zone. Free alkali is then available throughout the remainder of the concrete.

Nukote HLT has the unique ability to penetrate extraordinarily deep into the interior of the concrete, permeating through its many paths of reticulation.

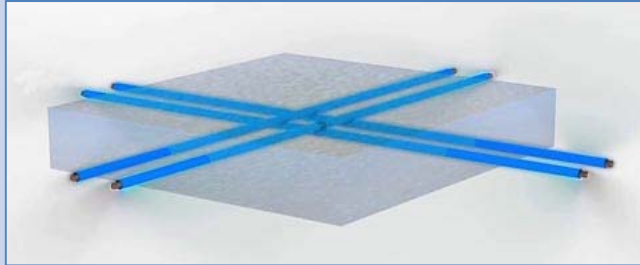
This is due to Nukote HLT's ability to control the molecule size and also its ability to pass through its own self along with certain other special ingredients.



NUKOTE HLT



Setting Performance Standards



Unlike shallow acting thixotropic gel producing sodium silicates, Nukote HLT penetrates ultra-deep into concrete.

As Nukote HLT penetrates the concrete it integrally seals it, as well as supplements, hardens and strengthens it.

Nukote HLT has unique ability to render harmless existent internal corrosive activity by neutralizing acids and etc., which may already be attacking the integrity of concrete's embedded steel.

Nukote HLT unlike shallow-depth penetrating sodium silicates treats virtually every ailment or potential ailment associated with concrete, even to the point of increasing its compressive and flexural strengths, in most cases. Also unlike other products, Nukote HLT benefits are innumerable, benefits not realized from sodium silicate based products.

Should you have any further questions, please do not hesitate to contact us.



Polyurea Liners in waste water application and relevance of its properties

Authored by: Kishore Kumar

Overview:

Basic physical properties such as tensile, elongation, compressive, tear values, abrasion resistance, hardness, modulus and flexural have been used for product (liner) evaluation and comparison between different technologies as well as different formulation in same or similar technologies. It is author's opinion and rational that permeability, chemical resistance, abrasion resistance, tear values and adhesion that is the critical physical properties for increased corrosion protection and performance in waste water applications. This property supported by ease of application, moisture insensitivity, credibility and experience of the manufacturer as well as the contractor assure of maximizing the life expectancy of liners in wastewater infrastructure.

Please note that when comparing similar technologies like Polyurea, Polyurethane, Polyurea –Polyurethane hybrids, the elastomeric properties have linear relations and do have a bearing on most physical properties if one is altered.

The Increased hardness usually reduces abrasion, tear values and elongation. This change may be as a result of trying to increase the tensile values. There is an optimum and desired value for each application and these values should be the sole criteria and bench marked instead of trying to meet a physical property of individual manufacturer. These values are more often to zero on their products and a marketing tool than any functional requirement.

Today's wastewater treatment systems have become more aggressive primarily due to the proliferation of microbiological induced corrosion and abrasive forces in the waste stream, advances in odour control and reduction, legislations and restrictions of heavy metals in the stream are the primary reasons for the increase in the corrosive effects in today's wastewater treatment plants and collection systems.

Tensile and Compressive values

What significance is tensile strength of a coating system at 2 mm (80 mils), over a 100-150 mm (4-6 inch) slab of 40 Newton concrete .There is nothing wrong in having more tensile values but it is the adhesion of a coating to concrete which is a more significant and relevant test. Selection criteria and appropriate methodology need to be employed when determining suitability of protective linings. Any increase in tensile value beyond a threshold value is insignificant.



Nukote recommend a value between 20-30 Mpa in conjunction with critical property values. Similarly high compressive values are not required or a design criteria in waste water applications which are used as a marketing tool by other technologies. A compressive values more than the standard concrete value is sufficient as per Nukote standards. This value is more than sufficient to stand the head pressure in a deep Man Hole

Hardness and Abrasion

Rather than simply interpret value for hardness, which by itself is not very meaningful, the value should be read in conjunction with abrasion resistance of the liner. A lower abrasion loss value is more relevant for protective liners than the hardness. Higher the hardness lowers the abrasion values. A balance should be made when choosing a liner and it is always desirable to have a better abrasion resistance liner to a hard one. Nukote recommend < 12 mg loss liner when tested as per ASTM D 4060 tabor abrasion and hardness value of > 90 Shore A(45 D) as per ASTM D 2240.

Tear Strength

Compared with other elastomeric materials, Polyurea are well known for their inherent strength and abrasion resistance. These characteristics are reflected in tear strength, a performance attribute that is critical for many applications. The tear strength is often a key material selection parameter, suppliers, processors and end-users need to factor and Nukote recommend value more than 75 Kn/M for liners to be used in Waste water in conjunction with other properties.

Concrete Protection:

Concrete is the most widely used construction material in wastewater collection and treatment systems. Unfortunately, significant corrosion can occur to unprotected concrete when sulfide generation in wastewater is not controlled. Sources of sulfide in wastewater includes unregulated and/or uncontrolled industrial discharges, degradation of sulfur containing organic matter, or the microbiological reduction of sulfate or other oxidized forms of sulfur. The construction of regional collection and treatment systems has increased wastewater travel time in collection systems, culminating in anaerobic wastewater and consequently increased sulfide generation. A major cause of odors is hydrogen sulfide, a gas detectable at extremely low concentrations.



Hydrogen sulfide is notorious for its toxicity, as well as its ability to corrode a number of materials used in construction of sewers and treatment plants, including concrete. Concrete corrosion is caused by the aerobic microbial oxidation of hydrogen sulfide to sulfuric acid and the subsequent chemical reaction of the acid with the cement binder in the concrete.

KEY Material Properties

- Chemical resistance
- Permeation
- Abrasion resistance

Chemical Resistance

Although the largest constituent of wastewater is water, a multitude of chemicals such as alkalis, acids, solvents makes its way and found in small but corrosive amounts. Bacteria are the primary cause of corrosion attack in wastewater systems, these bacteria oxidizes hydrogen sulfide gas to create sulfuric acid which attacks concrete structures been designed and tested and with a multitude of chemicals including 50% sulfuric acid, sodium hydroxide, bleach, acetic acid, acetone, just to name a few. This extensive testing coupled with extensive third party testing and numerous case histories provide a high level of long- term protection.

Permeation, Permeability

Lower Permeability is the most desired property for a liner in immersion services coupled with its ability to resist the medium in which it is immersed. The liner should be able to resist or offer maximum resistance to transmission of vapors and molecules of corrosive particles (i.e. sulfuric acid, water vapor, hydrogen sulfide, salts, etc.) to penetrate through the polymer matrix of a coating/lining system and begin attacking the coating/lining itself

Abrasion Resistance

Since wastewater treatment systems have host of abrasives in the stream including sand, grit, salts etc., a liner to resist these and which have a lower loss as per ASTM 4060 provides the right tool/test to measure the wear resistance.



Nukote ST and Nukote XT Plus is used globally in waste water applications in the following Sewerage, Sewerage Collection & Transport, Sewerage Treatment and Waste Water Industry, Effluent treatment applications.

- 1) Primary Containment
- 2) Land fills
- 3) Pipeline Coating-External
- 4) Pipeline Coating Internal
- 5) Pipeline Field Jointing External-Internal.
- 6) Man hole Chamber walls
- 7) Manhole chambers, Pump station, Wet well Benching
- 8) Manhole Covers-MS-DI.
- 9) Raw sewage intake chambers.
- 10) Waste Water Storm water Pond
- 11) Anaerobic Digester

Summary

When a system with good chemical resistance, excellent permeability and superior abrasion resistance, are selected and properly installed and inspected, longevity and maximum asset life cycles are guaranteed apart from the adhesive bond to the concrete substrate as well as the Intercoat bond in multi- layer system.

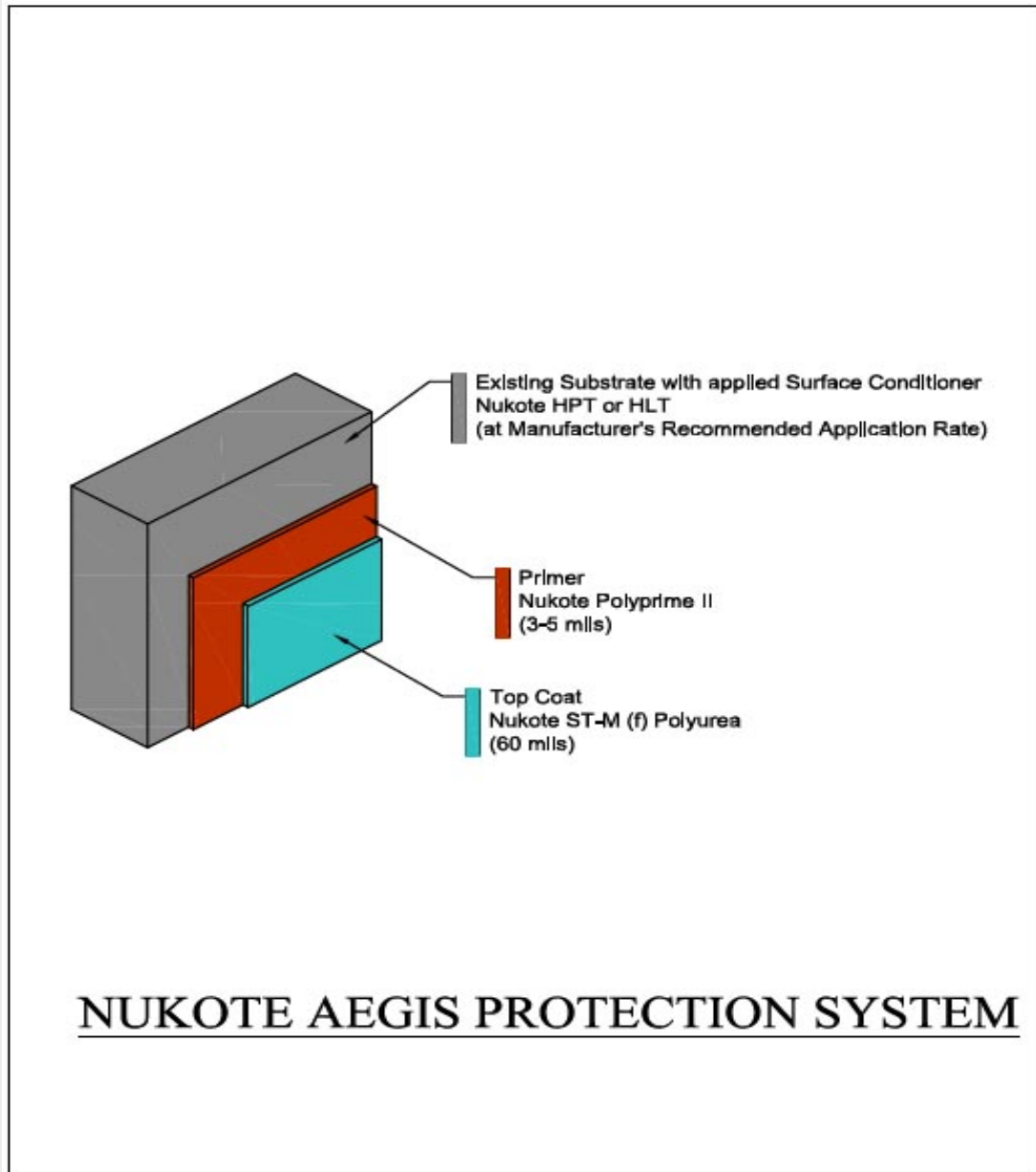


4. NUKOTE AEGIS™ PROTECTION AND RESTORATION SYSTEMS



NUKOTE AEGIS™ PROTECTION SYSTEM

Innovation in waterproofing and protection of new concrete structures using proprietary Nukote Coating Systems technology through waterproofing and maintaining the structural integrity of the concrete substrate itself, not just the surface.



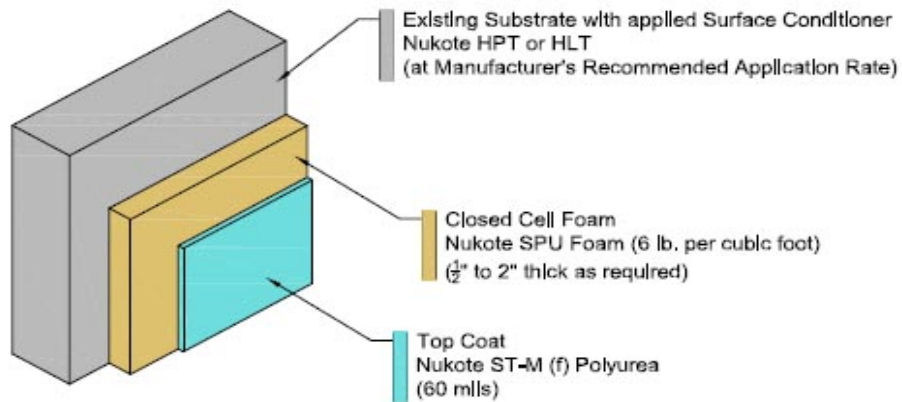
NUKOTE COATING SYSTEMS



NUKOTE AEGIS™ RESTORATION SYSTEM

Innovation in waterproofing and restoration of existing concrete structures using proprietary Nukote Coating Systems technology through waterproofing and strengthening of the concrete substrate itself, not just the surface.

NUKOTE COATING SYSTEMS



NUKOTE AEGIS RESTORATION SYSTEM



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS

Work Methods Statement

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I. GENERAL

A. User Guideline Preface

1. The Nukote Aegis Protective and Restoration Systems are based on the experience acquired during their involvement with the construction, protection and maintenance of structures in waste water transmission, collection & treatment plants, manholes, wet wells, including other sewer related equipment. Where appropriate they are based on, or reference is made to, international, regional, national and industry standards.
2. The objective is to set the recommended standard for good design and practice applied by Nukote Coating Systems International, LLC in waste water and other infrastructure and thereby to achieve maximum technical and economic benefit from standardization.
3. The type and typical application thickness of the Nukote Protection and Restoration Systems are dependent on the exposure and abuse levels. The recommended TDFT will provide adequate uniform membrane, chemical resistance, abrasion resistance, impact resistance, resistance to mechanical damage.
4. For spray applying Polyurea systems, the correct equipment is critical to achieve proper mixing. For fast set spray systems, equipment shall be a plural component impingement spray machine capable of producing the Polyurea system suppliers published recommended processing characteristics. Studies have shown that fast set spray polyurea mechanical properties are influenced by temperature and the dynamic spray pressure. If material is processed with inadequate equipment, or is sprayed off ratio, failures may occur. Polyurea and Polyurethane Elastomers must be applied only by trained Professionals.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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II. SCOPE

A. The work described within details complete systems for protection of new manholes and structures and the restoration for manholes and other sanitary sewer structures. This section details the methods, procedures, materials and equipment required to provide a total system for protection or restoration of the structure. The completed system will provide a corrosion resistant liner that eliminates water infiltration and exfiltration within limits and exclusions as defined in the document when applied to a substrate meeting the acceptance criteria as Per NACE-No.6/SSPC SP-13 after surface preparation or other referred standards.

III. REFERENCES AND STANDARDS

A. All references and standards listed shall be the latest revisions.

1. References

- a) American Society for Testing and Materials (ASTM)
- b) International Standard Organization (ISO)
- c) National Association of Corrosion Engineers (NACE)
- d) SSPC
- e) International Concrete Repair Institute (ICRI)
- f) American Concrete Institute (ACI)

B. ASTM Standards

1. ASTM E-1907: Calcium Chloride Test for Moisture Vapor Transmission
2. ASTM D-4263: Test Method for Indicating Moisture in Concrete
3. ASTM E-337: Test Method for Measuring Humidity with a Psychomotor
4. ASTM D-6132: Test Method for Nondestructive Measurement of DFT
5. ASTM D-4138: Test Method for Destructive Measurement of DFT
6. ASTM D- 4541: Method for Pull-Off Strength of Coating Portable Testers
7. ASTM D-4787: Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates

C. SSPC Standards:

1. SSPC Publication No 91-08: Surface Preparation Specifications
2. SSPC TU-13: Surface Preparation of Concrete
3. SSPC TU-2: Design, Installation and Maintenance of Coating Systems for Concrete



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III. REFERENCES AND STANDARDS (CONTINUED)

D. NACE Standards

1. NACE Standard SP 0188: Discontinuity (Holiday) Testing for Protective Coatings
2. NACE Standard SP 0892: Linings over Concrete for Immersion Service
3. NACE No.6: Surface Preparation of Concrete
4. NACE 6/SSPC 13: A joint standard for Surface preparation of concrete

E. Other standards

1. ICRI Technical Guidelines 03730: Surface Preparation Guidelines for the Repair Deteriorated Concrete Resulting from Reinforced Steel Corrosion.
2. ICRI Technical Guidelines 03731: Guide for Selecting Application Methods for the Repair of Concrete Surfaces.
3. ICRI Technical Guidelines 03732: Guide for Selecting and Specifying Surface Preparation for Sealers, Coatings and Membranes.

IV. QUALITY ASSURANCE

A. Single Source Responsibility:

B. Provide conditioners, primers and undercoat materials specified and produced by the same manufacturer, or materials recommended by designer and manufacturer, for each type of Polyurea special coating / lining specified to ensure compatibility, and proper chemical and mechanical bond. Provide conditioners, primers and other required materials produced by the same manufacturer, or recommended by manufacturer, for Joining System specified to ensure compatibility, and proper mechanical bond. This would include physical properties, adhesion and no adverse reaction between various systems.

C. It is required that the Installer applying the Nukote Aegis Protection and Restoration Systems must be trained and certified by Nukote International Coatings as the designer and manufacturer of the specified products, and shall have in existence a program of training, certifying and technically supporting a nationally organized Approved Contractor Program with annual re-certification of its participants through Nukote International Coatings training courses.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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IV. QUALITY ASSURANCE (CONTINUED)

D. EQUIPMENT REQUIREMENTS

1. For fast set spray systems, equipment shall be a plural component impingement spray machine capable of producing the Polyurea system suppliers published recommended processing characteristics.

E. DELIVERY, STORAGE, AND HANDLING

1. Deliver product in the manufacturer's original, new, unopened packages and containers clearly marked with manufacturer's identification, printed instructions, lot numbers and shelf life expiration date for each component.
2. Store and ship materials in tightly covered containers in a dry, well-ventilated area at an ambient temperature of 68-104°F, away from hazards. Drums should not be stored directly on the concrete substrate. If lower temperatures are experienced, material must be effectively reconditioned according to Polyurea system supplier/ manufacturer.
3. Before use, material must be conditioned to a standard temperature as per the Polyurea system supplier / manufacturer.
4. Pigmented resin blend components must be properly agitated prior to use as per Polyurea system supplier's / manufacturer's recommendations.

F. PROJECT CONDITIONS

1. Not all conditions are same and it is advisable to notify the Nukote Regional Technical Manager of the environmental corrosivity rating, chemical exposure, abuse level, and other operating parameters so that he may modify and specify the correct products and system to suit the requirement, if required.
 - A. For temperatures below 40° F consult Nukote Coatings Regional representative.
 - B. All surface preparation will depend upon the substrate involved.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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IV. QUALITY ASSURANCE (CONTINUED)

- C. All applications on concrete are based on normal high strength reinforced concrete or precast concrete
- D. Provide proper safety equipment; observe all safety & health guidelines. Surfaces shall be kept free of re contamination once surface preparation has begun.
- E. Protect adjacent surfaces, equipment, etc. from damage resulting from work of the application of Polyurea system. If necessary, mask and / or cover adjacent surfaces, fixtures, equipment, etc. by suitable means.
- F. Do not apply material over free water or wet surfaces. This will lead to disbondment, pinholes and subsequent / failure of the Polyurea coating / lining system.
- G. HEALTH AND SAFETY
 - 1. General: Ventilation, electrical grounding, and care in handling paint, solvents, and equipment are important safety precautions that shall be observed, and is the sole responsibility of the Contractor.
 - 2. Ventilation: It is essential that the explosive vapors released during and after application of coatings be removed from all areas considered a confined space, so as not create any chance of a safety concern. During blasting and coating operations all personnel shall wear proper respiratory and safety equipment.
 - 3. Grounding: Blasting and coating hoses shall be grounded to prevent accumulation of a charge of static electricity.
 - 4. Lighting: Explosion proof artificial lighting shall be provided for all work where and when required. Light bulbs shall be guarded to prevent breakage. Lighting fixtures and flexible cords shall comply with the requirements of NFPA 70 "National Electrical Code" for the atmosphere in which they will be used.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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IV. QUALITY ASSURANCE (CONTINUED)

5. **Toxicity:** The solvents used with some of the specified coatings or cleaning solvents are explosive at low concentrations and are highly toxic. Because of toxicity, the maximum allowable concentration of vapor for several common solvents shall be not greater than the Immediately Dangerous to life or Health (IDLH) limits as shown in the National Registry of Toxic Chemical Substances.
6. **Protective Clothing:** When handling or applying coatings, workmen shall wear gloves, eye shields and all other necessary protective clothing to assure workmen's safety.
7. **Fire:** During mixing and application of coating, all spark producing material and smoking shall be prohibited in the vicinity. An appropriate type of fire extinguisher shall be kept nearby.
8. **Material Safety Data Sheets (MSDS):** Contractor shall maintain MSDS Reports on all specified coating materials on project site, which should be accessible to employees.

V. SYSTEM PERFORMANCE REQUIREMENTS

- A. The materials to be utilized in the installation of these systems shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of the corrosion protection products shall have long proven experience in the production of the lining products utilized and shall have satisfactory installation record.
- B. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.
- C. The coating systems shall be a spray-applied multi-layered system consisting of products designed for use in coating new or existing manholes, wet wells, lift stations, treatment plants, and other structures as described below:
- D. Polyurea system must meet the definition of a polyurea system as per the Polyurea Development Association.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS

Work Methods Statement

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V. SYSTEM PERFORMANCE REQUIREMENTS (CONTINUED)

- E. Material Compatibility: Provide conditioners, coating and repair materials, primers, finish coat and related materials that are compatible with one another and the substrates indicated under conditions of service required as recommended by the Polyurea system supplier / manufacturer. This would include physical properties, adhesion and no adverse reaction between various systems.
- F. Polyurea lining system must meet or exceed all of the physical properties, test results, and certifications as noted in Technical Data sheet for polyurea elastomer only, and the Foam Polyurea composite where ever applicable.
- G. All thermoset materials, polyurea included, experience linear shrinkage during set and cure. It is extremely important to understand the shrinkage value and account for this dimensional change when planning the installation work of the polyurea elastomer system.

VI. DESCRIPTION OF COATING SYSTEM

A. Nukote Aegis Protection System

1. Proprietary purging and hydro locking treatment: Nukote HLT or Nukote HPT applied at 170 SF per Gallon.
2. Recommended primer: Nukote Polyprime II applied at a thickness of 3-5 mils.
3. Aromatic Lining Systems: Nukote ST-M (f) applied at a rate of 60 mils.
4. Polyurea Joint filler: Nukote JF. (rate as suggested by manufacturer)
5. Intercoat Primer. Nukote IC prime (rate as suggested by manufacturer)



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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VI. DESCRIPTION OF COATING SYSTEM (CONTINUED)

B. Nukote Aegis Restoration System

1. Proprietary purging and hydro locking treatment: Nukote HLT or Nukote HPT applied at 170 SF per Gallon.
2. Closed cell Polyurethane Foam: Nukote SPU Foam (6 lb per CF) applied at the required thickness (1/2" minimum).
3. Aromatic Lining Systems: Nukote ST-M (f) applied at a rate of 60 mils.
4. Polyurea Joint filler: Nukote JF. (rate as suggested by manufacturer)
5. Intercoat Primer. Nukote IC prime (rate as suggested by manufacturer)

C. In many instances, there may be related products / materials that will be used in combination with the installation of the Polyurea coating / lining system so as to complete the project. These may be used to enhance adhesion or the performance of the installation/application of the Polyurea coating / lining system once the project has been completed. These may include the following and should be submitted two weeks prior and approved by Nukote prior to project start.

1. Repair and Resurfacing Materials for Concrete
2. Third party Nukote Approved Sealants for Concrete and other substrates
3. Third Party Nukote approved Primers for Concrete and other substrates.
4. Nukote Approved Bug-Hole Repair Material: such as Epoxy, or polymer-modified, scratch coat as recommended by Polyurea system supplier / manufacturer.
5. Intercoat Adhesion Promoter: may include a "solvent system" or primer.
6. Aggregate: Clean, dry aggregate appropriate to the application.
7. Soluble Salt Removal: for example Chlor*Rid™ or HoldTight®, or Water Soluble Degreasers



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS

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VII. INSTALLATION OF SYSTEM

A. Sequence Of work

1. Pre Site inspection of the site.
2. Application scheduling.
3. Confined space access and support.
4. Weather conditions / delays
5. Surface cleaning and preparation.
6. Substrate repairs.
7. Hydro lock application
8. Heating the substrate if required (site and weather specific)
9. Substrate priming (if required)
10. Application of Low density foam (if required)
11. Application of polyurea spray elastomer system,
12. Review or inspection of applied area
13. Rectification and necessary repairs
14. Sign off and Release of the area to facility owner

B. Surface Preparation

1. Remove all oil, grease, dirt, water or other contaminants in accordance with ASTM D 4258 and SSPC -SP- 1. Abrasive grit blast, wet abrasive blast or high pressure water blast all surfaces to be coated, to remove all laitance, efflorescence, surface hardeners, curing compounds, old coatings and loose concrete, in accordance with SSPC-SP 13 /NACE No. 6 or ASTM D 4259. A surface texture similar to that of medium-coarse sandpaper should be attained. Inspect and repair the concrete for cracks and other defects with pre-approved epoxy concrete repair compounds. Inspection of the concrete construction joints (casting stops), edges, corners, joints etc. Abrasives used shall be clean, a uniform grade and of an appropriate size to obtain the specified surface finish and profile. Water used with high-pressure water blasting or wet abrasive blasting shall be clean potable water. Thoroughly clean all blasted surfaces to remove all dust and debris after dry blasting, or to remove all water, sludge and debris after wet blasting.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS

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Surface Preparation (Continued)

2. Refurbish all cracks, joints and other defective areas in concrete using appropriate repair materials, where applicable.
3. Repair all moving cracks which have opened to a width of ½” or greater must with an Elastomeric caulking material as per the manufacturer’s instructions.

C. Hydro Lock Treatment (HLT)

The prepared surface shall then be treated and sealed with Nukote HLT or HPT , a 100% solids VOC free product suitable for application on damp surface on positive as well as negative side and capable of penetrating more than or up to 8” and forming a permanent flexible hydrostatic barrier. If curing compounds, release agents, wax etc. is on substrate Nukote HLT will not be able to penetrate. These agents or bond breakers need to be removed by water blasting or abrasive mechanical means. Nukote HLT must be applied by low pressure spray to the substrate. Leave it for 24 hours and hydro blast and expose the profile and to remove the purged out contaminants

D. Primer Application (if required)

1. Ensure your area to be primed is clean and dry apply the recommended primer over the entire concrete surface prepared and able to be completed within the primers recoat window. Foam is to be applied when Primer is tack free.
2. Use the right primer depending on site conditions, moisture level, and speed of application required.
3. Nukote Polyprime II should be applied through the same heated high pressure plural component proportioning equipment as will be utilized for insulation and liner material application with primary and hose heaters set to 140° F temperatures. Apply Nukote Polyprime I at low to moderate pressures, using a standard cross hatch pattern ensuring full coverage of the substrate.
4. The nominal dry film thickness shall be 3-5 mils. Apply the product in light even lifts and do not allow primer to pool.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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VII. INSTALLATION OF SYSTEM (CONTINUED)

- E. Application of low density foam (if required)
1. Apply Nukote Low density SPU Foam using high pressure plural component proportioning equipment primary and hose heaters at 150° F minimum and pressure settings at 1800 psi minimum. Apply SPU Foam in a moderate speed repeat the process until the foam rise covers the voids.
 2. Note: Foam rises and requires 1-2 minutes to reach full expansion dependent on temperatures and density of the product.
 3. Note: Apply evenly ensuring a uniform (slight modulating) surface to minimum thickness levels.
 4. Note: There is no recoat window for foam products but ensure that you complete each lift in a given area to the final thickness in the same period to ensure uniformity of the installation.
- F. Application of Polyurea liner
1. Nukote Aromatic Polyurea ST-M (f) will be applied in a single monolithic layer to a nominal dry film thickness of 60 mils by a high pressure plural component Graco Reactor or a similar plural spray Reactor at 2000 to 2500 psi. Each day's work should be terminated on a Joint or pre-determined termination line. Nukote Aromatic Polyurea will be tack free in minutes and available for inspection and testing at the convenience of the client's inspector or inspectors.
- G. Repairs to Polyurea liner
1. If the liner needs repairs after exceeding the re-coat window, recondition the existing undamaged liner using the following steps:
 - a) Remove all damaged liner and thoroughly clean the surface and surrounding liner
 - b) Apply a thin coat of Nukote IC Prime (30-40 microns) and ensure the entire surface is wetted. Allow Nukote IC Prime to be tack free, dry at 70°F and 50% relative humidity for 30-45 minutes.
 - c) Apply polyurea liner to match thickness of surrounding areas.



NUKOTE AEGIS PROTECTION AND RESTORATION SYSTEMS **Work Methods Statement**

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VIII. INSPECTION AND QUALITY ASSURANCE

- A. The Application Contractor shall provide a daily record of all application process information, including temperatures, relative humidity, dew point, procedures and inspection data.
- B. The dry film thickness shall be determined from the total consumption of the coating material. This quantity can be derived from the Graco reactor readings.
- C. The environmental conditions and pump readings are to be recorded on a daily basis.
- D. Dry Film Thickness Measurement:
 - 1. Nukote recommends non-destructive testing (NDT) for measuring the recommended DFT which can be accomplished through the consumption figures available through the machine. Any destructive tests should be limited or avoided at the best. The Total Nominal DFT shall be exclusive of filler and primer.

IX. WARRANTY

- A. The Manufacturer and Applicator warrant the Nukote Aegis Protection and Restoration Systems and products against failure for a period of 10 years. "Failure" will be deemed to have occurred if the protective lining fails to (a) prevent the internal deterioration or corrosion of the structure (b) protect the substrate and environment from contamination by effluent or (c) prevent groundwater infiltration. If any such failure occurs within 10 years of initial completion of work on a structure, the damage will be repaired to restore the lining at no cost to the Owner within 60 days after written notification of the failure. "Failure" does not include damage resulting from mechanical or chemical abuse or act of God. Mechanical or chemical abuse means exposing the lined surfaces of the structure to any mechanical force or chemical substance not customarily present or used in connection with structures of the type involved. There are no warranties express or implied other than those specifically stated in this section. Any liability for consequential and incidental damages is expressly disclaimed. Liability is limited to and shall not exceed the purchase price paid.



5. NUKOTE PRODUCT DATA SHEETS

NUKOTE HLT®

Hydro Lock Treatment, Concrete Gel Barrier Treatment

DESCRIPTION:

Nukote HLT is a part of the range of primers and concrete treatments which complements our unique advanced polyurea polymer coatings so that complete solutions are available for nearly all coating applications. Nukote HLT is a unique VOC/VOS free penetrant in a colloidal liquid base which, when applied to Portland cement concrete produces a permanent hydrostatic barrier whilst imparting significant structural, waterproofing and strengthening benefits whilst reducing potential for pin-holing in the polyurea topcoat.

Nukote HLT when applied as a single coat with an airless spray unit penetrates up to 8 inch (200 mm) and forms a permanent, passive, non destructive colloidal gel barrier beneath the concrete surface. Nukote HLT purges oil and other contaminants from within the concrete however for serious contamination, Nukote recommend using Nukote HPT. Nukote HLT can also be used as a permanent stand alone concrete waterproofing and enhancing treatment system in non critical applications. Nukote HLT can be applied to freshly poured concrete as an alternative cure to water cure where it imparts significant physical benefits.

FEATURES

- 100% Solids with zero VOC
- Withstands a maximum of 114 feet of hydrostatic pressure
- Can be applied to the positive or negative sides of concrete structures
- Arrests leakage through concrete even while it is occurring and travels against the water flow, when applied on the negative side
- Fills concrete pores, voids and capillaries with an insoluble, permanent precipitate barrier, contaminants are purged to the surface for easy removal
- It densifies, strengthens and waterproof new and old concrete
- Acts as an effective chloride and electrolyte barrier to preserve and protect embedded steel
- Reacts with and converts free alkali, calcium hydroxide and other unused residues
- Absorbs totally into the concrete and does not affect the surface profile
- Fills micro-pores and subsurface voids and inhibits vapour transmission to minimize out-gassing, which can promote in pin-holing and blisters in a polyurea spray applied coating.
- When applied as a curing agent on newly poured concrete, Nukote HLT minimizes surface voids, imparts far greater strength, durability and impermeability, with greater resistance to freeze damage and chemical attack.
- Nukote HLT is primarily intended as a pre-treatment prior to application of Nukote Polyurea however significant benefits area achieved by applying Nukote HLT only.

TYPICAL USES:

- Contaminated Concrete
- Wet, Damp or Below Grade concrete
- Concrete with corrosion of embedded steel
- Curing Agent for freshly poured concrete

COLORS:

Cloudy White; dries clear

NUKOTE HLT®

Hydro Lock Treatment, Concrete Gel Barrier Treatment

TECHNICAL DATA (All values @77°F)

Solids by volume	100%
Volatile Organic Compounds	0 gram/ liter
Theoretical coverage@ 40 mils	180 ft ² /gallon
Specific Gravity (lb/gallon)	9.18
Shelf life	12 - 18 Months
pH	11.5
Flammability	None
Toxicity	None
Clean up solvent	Water
<i>(The above properties and values are highly dependent on equipment, spray gun, temperature, pressure and related parameters and slight variations are possible). The above values are as per NCSI Standard lab practices & methodology)</i>	

PACKAGING:

Nukote HLT is available in 50/52.8 gallons drums and 5/5.28 gallons Pails. OR UN approved totes of 276 gallons.

APPLICATION:

On Existing Concrete:

Remove any coating or surface finish that may resist penetration into the concrete interior.

Place a few drops of water on the surface to test surface porosity. If the water doesn't soak in immediately it needs to be opened up with grinding, sweep blasting or similar. In hot climates, slightly dampen the surface with a mist coat of water. Apply the Nukote HLT using a medium to high pressure airless spray unit with a 0.019" fan spray nozzle. While spraying, keep the spray tip 6 inch from the surface and work side to side and from the bottom up (if applicable)

Apply the Nukote HLT at a rate of 180ft²/ gallon (minimum) with a spray pattern & overlapping by 50% on each pass. Wait for at least 24 hours then flush with water to remove purged salts, particles and other contaminants.

Where contaminants have been purged, retest the surface for porosity if additional contaminants are present, the surface will not absorb water and an additional treatment of Nukote HLT is required. Carry out surface treatment and polyurea application to Nukote specifications.



Setting Performance Standards

NUKOTE HLT®

Hydro Lock Treatment, Concrete Gel Barrier Treatment

On New Concrete:

Nukote HLT provides an alternative cure method providing cure equal to or better than water curing. Concrete is significantly more water proof, abrasion resistant, chemical resistant and less likely to produce pin-holing in a polyurea coating.

Nukote HLT should be applied with a low pressure spray apparatus or flooded on as soon as practicable following surface finishing. Recommended minimum coverage is 180 ft²/ gallon for broom finish and 244 – 285 ft²/gallon for burnished finish.

PRECAUTIONS:

- Nukote HLT may etch glass or dull shiny aluminum
- Nukote HLT spray mist is not hazardous to breathe however we recommend wearing a face mask
- Protect areas not intended for coverage
- Do not apply when the temperature is freezing
- For more information read the MSDS.

LIMITATIONS:

Do not open until ready to use, and store in a sealed container after opening.

WARRANTIES AND DISCLAIMERS:

Nukote Coating Systems International, a Nevada, USA Corporation warrants that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper mixture and application of the components by the applicator. Nukote Coating Systems has no role in the application of the finished polymer other than to manufacture and supply its two components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of plural component equipment and application of plural component materials. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Nukote Coating Systems International and executed under seal by a company officer.

PDS Product
Data Sheets

2010-2011

NUKOTE COATING SYSTEMS INTERNATIONAL LLC

8550 West Desert Inn Road / Suite 102-652 / Las Vegas, Nevada USA 89117

www.ncs-intl.net

Global Solutions - Local Experts

NUKOTE HPT®

Hydro Purge Treatment, and Waterproofing Treatment

DESCRIPTION:

Nukote HPT is a part of the range of primers and concrete treatments which complements our unique advanced polyurea polymer coatings so that complete solutions are available for nearly all coating applications. Nukote HPT is a unique, non hazardous VOC/VOS free penetrant in a colloidal liquid base which, when applied to Portland cement concrete waterproofs, purges deep seated contaminants, prevents, arrests or retards corrosion of embedded steel and strengthens and densifies the concrete whilst reducing potential for pin-holing in the polyurea topcoat.

Nukote HPT is recommended where serious contamination or internal corrosion in thick concrete is suspected. Nukote HPT is applied in a single application in two coats with an airless spray unit. Nukote HPT can also be used as a permanent stand alone treatment where internal steel corrosion is suspected or as a preventative anti-corrosion treatment. For the maximum hydrostatic pressure barrier and waterproofing, Nukote recommend using Nukote HLT.

FEATURES

- 100% Solids with zero VOC.
- Can be applied to the positive or negative sides of concrete structures.
- Contains Lubricant to penetrate deeply into the concrete.
- Fills concrete pores, voids and capillaries with an insoluble, permanent precipitate barrier, and contaminants are purged to the surface.
- Prevents arrests or dramatically retards corrosion of embedded steel up to 16 inches from the concrete surface.
- Acts as an effective chloride barrier to preserve embedded steel and isolates the steel from free electrolytes.
- It densifies waterproofs and strengthens existing concrete.
- Absorbs totally into the concrete and does not affect the surface profile.
- Fills micro-pores and subsurface voids to minimize out-gassing and the potential for pin-holing and blisters in a polyurea spray applied coating.

TYPICAL USES:

- Contaminated Concrete
- Preventative Treatment where external conditions may promote corrosion of embedded steel
- Treatment of concrete with known corrosion of embedded steel
- General waterproofing, strengthening and densification of concrete.

APPEARANCE:

Clear, odorless, non-petroleum, colloidal liquid which is environmentally neutral and user friendly.

PACKAGING:

Nukote HPT is available in 50/52.8 gallons drum and 5/5.28 gallons Pail. OR UN approved totes of 276 gallons.

NUKOTE HPT®

Hydro Purge Treatment, and Waterproofing Treatment

TECHNICAL DATA (All values @77°F)	
Solids by volume	100%
Volatile Organic Compounds	0 gram/ liter
Theoretical coverage@ 40 mils	90 ft ² / gallon
Specific Gravity (lb/gallon)	9.18
Shelf life	12 - 18 Months
pH	12
Flammability	None
Toxicity	None
Clean Up solvent	Water
<i>(The above properties and values are highly dependent on equipment, spray gun, temperature, pressure and related parameters and slight variations are possible). The above values are as per NCSI Standard lab practices & methodology)</i>	

APPLICATION:

Remove any coating or surface finish that may resist penetration into the concrete interior.

Place a few drops of water on the surface to test surface porosity. If the water doesn't soak in immediately it needs to be opened up with grinding, sweep blasting or similar. Apply the Nukote HPT using a medium to high pressure airless spray unit with a fan spray nozzle. Apply twice to the point of saturation with back to back coats. Each coat should be at a rate of 90 ft² /gallon. The first coat should be applied in a north/south direction with the second coat applied in an east/west direction. Overlap spray patterns by 50%. On vertical surfaces, start at bottom and work towards the top. Do not allow Nukote HPT to pool on the surface.

Wait for at least 24 hours then water blast, grind or wash to remove purged salts, particles and other contaminants from the surface. Where contaminants have been purged, retest the surface for porosity. If additional contaminants are present, the surface will not absorb water and an additional treatment of Nukote HPT is required.

Carry out surface treatment and polyurea application to Nukote specifications.

PRECAUTIONS:

- Nukote HPT may etch glass or dull shiny aluminum and may be hard to remove when dry
- Nukote HPT spray mist is not hazardous to breathe however we recommend wearing a face mask
- Protect areas not intended for coverage
- Do not apply when the temperature is near freezing
- For more information read the MSDS



Setting Performance Standards

NUKOTE HPT®

Hydro Purge Treatment, and Waterproofing Treatment

LIMITATIONS:

Do not open until ready to use, and store in a sealed container after opening. Adding a nitrogen blanket is strongly recommended for storage after opening.

WARRANTIES AND DISCLAIMERS:

Nukote Coating Systems International, a Nevada, USA Corporation warrants that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper mixture and application of the components by the applicator. Nukote Coating Systems has no role in the application of the finished polymer other than to manufacture and supply its two components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of plural component equipment and application of plural component materials. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Nukote Coating Systems International and executed under seal by a company officer.

NUKOTE POLYPRIME II **URETHANE POLYUREA PRIMER**

DESCRIPTION:

Nukote Polyprime II is a two component 1:1 ratio, rapid setting, non-sag, and liquid applied, aromatic urethane polyurea primer suitable for concrete, masonry and metal substrates. Nukote Polyprime is easy to apply, sets quickly, and has excellent physical properties.

FEATURES

- Non Toxic
- Fast setting
- Odourless
- Low temperature curing, 10°F
- Rapid Cure and In-Service Times
- Remains Flexible in Wide Range of Temperatures

TYPICAL USES:

- Polyurea Primer
- Concrete primer for other NCS coatings
- Bonding agent for Plastics, Masonry, Wood and EPS

COLORS:

Standard color is Black. A clear amber and gray are also available on request and subject to minimum quantity requirements

PACKAGING:

Nukote Polyprime II is available in 100 gallon sets shipped in metal drums of 50 gallons each of Side A and side B or 10 gallon kits shipped in plastic pails of 5 gallons of side A and 5 gallons of side B, or 552 gallons tote sets shipped in hardened plastic-metal reinforced UN approved totes of 276 gallons each of side A and side B.

SURFACE PREPARATION:

The surface of a concrete subfloor should be dry, smooth, and structurally sound. It should also be free of depression, scale, or foreign deposits of any kind. Remove all curing compounds. Abrasive blast, sweep blast or water blast to remove all laitance and expose all voids. Use a good quality epoxy filler / mortar for blow hole filling, skim coat or repairs. All concrete subfloors on or below grade level should be tested for moisture. On-grade or below-grade concrete floors should have a moisture barrier installed to protect from ground moisture.

Metal:

All surfaces should be clean and free from contamination. The surface should be assessed and treated in accordance with ISO 8504. Surface shall be Abrasive blast cleaned to the minimum Sa 2½, as per ISO 8501-1, for a visual assessment of surface cleanliness with an anchor profile of 2.75 – 4 mils. Manually prepared surfaces should be to a minimum standard of St 3 BS 7079: Part A1: 1989 at the time of coating.

NUKOTE POLYPRIME II **URETHANE POLYUREA PRIMER**

TECHNICAL DATA (All values @ 77°F) pigmented	
Solids by volume	100%
Volatile Organic Compounds	Nil
Theoretical coverage @ 4 mils)	401 ft ² /gallon
Specific Gravity (lb/gallon)	A-9.848, B-8.429
Viscosity in cps (ASTM D412)	A- 20 , B- 20
Shelf life	12 to 15 Months
Fire Rating UBC	Class 2
Flash point (ASTM D93)	>167°F
Service temperature	-4°F to 194°F
PROCESSING PROPERTIES (Under standard lab conditions)	
Mix Ratio V/V	1:1
Pot life	3 - 4 minutes
Tack free time, 4 mils @ 75°F & 50% RH	10 - 30 minutes
Dry to Recoat	10 - 30 minutes
Maximum recoat time	2 - 3 hours

APPLICATION:

The volume mix ratio is 1 part Part-A to 1 part Part-B. Nukote Polyprime II should be applied using a HEATED proportioning dispensing system. This type of system transfers, meters, and mixes the co-reactive Part-A and Part-B components at a very high rate and at the required proportions. Precondition the drum to 77°F.

CURING:

Nukote Polyprime II is a rapid cure material that will be completely cured in approximately 60 minutes. Nukote Polyprime II is very sensitive to heat and moisture. Higher temperatures or high humidity may slightly accelerate the cure time.

EQUIPMENT CLEANUP:

Equipment should be cleaned with environmentally safe solvent, as permitted under local regulations, immediately after use.

NUKOTE POLYPRIME II URETHANE POLYUREA PRIMER

STORAGE:

Nukote Polyprime II has a shelf life of six (6) months from date of manufacture in original, factory sealed containers.

LIMITATIONS:

Surfaces must be dry, clean and free of foreign matter. Not UV stable. Will discolour in exterior applications. Containers that have been opened must be used as soon as possible. Nukote Polyprime II is difficult to clean up after it has cured. Do not dilute under any circumstance. Refer to general guidelines for more information.

WARNING:

This product contains Isocyanate and Solvent.

WARRANTIES AND DISCLAIMERS:

Nukote Coating Systems, LLC has no role in the manufacture of the finished polymer other than to supply its two components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of plural component equipment and application of plural component materials. Nukote Coating Systems International, a Nevada Corporation, warrants only that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper mixture and application of the components by the applicator. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Nukote Coating Systems International and executed under seal by a company officer.

Nukote SPU Foam *Polyurethane Insulation*

DESCRIPTION:

Nukote SPU Foam is a two-component, polyurethane spray foam that is available in densities from 1.69 - 3.75 lb/ft³. Low viscosities and 1:1 ratio make it extremely easy to apply using standard, high-pressure, high-temperature application equipment.

FEATURES

- Low viscosity
- Fast Cure
- Easy to apply
- Reduces down time

TYPICAL USES:

Nukote Foam is used for the thermal insulation of building walls, roofs, tanks, vessels and pipes. In roofing systems uses, Nukote Foam meets the requirements of UL 790 (ASTM E-108) in Class A and Class B configurations on combustible and non-combustible decks when covered with approved coatings. For additional information, on UL ratings, please contact a NCS technical representative. Please note a minimum of 2.5 lb/ft³ density foam is recommended for roofing applications. Please consult with NCSI for other Foam densities, applications and high temperature Fire rated Foams.

COLORS:

Clear or neutral, custom colors, blended to match any RAL number, are available upon request subject to minimum quantity.

PACKAGING:

Nukote SPU Foam is available in 100 gallons set shipped in metal drums of 50 gallons each of Side A and side B or 10 gallons kit shipped in plastic pails of 5 gallons of side A and 5 gallons of side B, or 552 gallons tote sets shipped in hardened plastic-metal reinforced UN approved totes of 276 gallons each of side A and side B.

COVERAGE:

Nukote SPU Foam may be applied at any rate to achieve the desired thickness. The foam densities, thickness have a linear relation to consumption. Theoretical spread rate for a 2.5 lb/ft³ density foam at 2 inch thickness is 4.41 pounds without any loss factor.

MIXING:

Nukote SPU Foam should not be diluted under any circumstance. Use appropriate solvent for purge line and flushing of equipment and if spraying stops for a period of time in excess of the pot life of the material. Thoroughly mix part B resin material with air driven power equipment until a homogeneous mixture and color is obtained.

Nukote SPU Foam

Polyurethane Insulation

TECHNICAL DATA (All values @77 °F for 2.5 lbs/ft³ density)	
Solids by volume	100%
Volatile Organic Compounds	0 gram/ liter
Theoretical Consumption rate for 2.50 lb/ft ³ Density	4.41 pounds @ 2 inch Thickness
Specific Gravity (lb/gallon)	A-10.348 ; B-9.764
Viscosity , in cps (ASTM D 412)	A-200-300, B-300-500
Shelf life	6 - 8 Months
Dimensional Stability(28 days@160°F, 100% RH, volume change)	< 8%
Closed cell content (ASTM D-1940)	90-95%
K Factor Initial/ Aged (ASTM C-177)	0.125/0.16
Permeance ASTM E 96	1.82
Water Absorption -24 hours (ASTM D 471)	< 0.5%
Tear strength (Die C ASTM 624)	428 – 456 lb/in
Impact Resistance	> 165 kgs
Fire Rating	Class 2
Flash point Pensky Martin (ASTM D93)	> 199.4°F
Service temperature (Dry)	-22°F to 248°F
PROCESSING PROPERTIES (Under standard lab conditions)	
Mix Ratio V/V	1:1
Rise time	2 - 5 seconds
Cream time	2 - 5 seconds
Tack free time (DFT & Temperature dependant)	8 - 15 Seconds
Initial cure time	4 hours

STORAGE:

Six to eight months in factory delivered, unopened drums. Keep away from extreme heat, freezing, and moisture. The use of drum heaters is encouraged to reduce material viscosity at low temperatures.

Nukote SPU Foam *Polyurethane Insulation*

SURFACE PREPARATION:

Surfaces to receive Nukote Foam must be clean and dry, free of dirt, oil, solvent, grease, loose particulates, frost, ice and other foreign matter which could inhibit adhesion. Moisture content and surface conditions of substrate are critical to adhesion of Foam and need to be verified by installing contractor in small test areas before proceeding with full application. The surface should be dry, smooth, and structurally sound.

All primers must be applied per Nukote published technical data sheets and product labels. Plywood, OSB, and lumber shall not have greater than 15% moisture content. Generally a primer is not required for these surfaces. On substrates where the moisture content cannot be determined or exceeds 15%, a suitable primer is recommended. Adhesion spray tests may be performed with insulating foam and the interface line checked upon cure for good cell structure and adhesion. Warming of these surfaces during winter conditions for increase adhesion is recommended. CMU, structural and poured-in-place concrete must have a minimum 28-day cure and moisture content below 15%.

It is recommended to Abrasive blast all steel surfaces to Sa 2½ with a good anchor profile. Priming is Optional and mandatory in certain cases. Consult NCSI for primer recommendations.

Painted Steel, galvanized steel, and aluminium panels: check surfaces for mill oil used in the manufacturing process and moisture condensate. All oil must be removed and the surface clean and dry before priming. Washed and dry painted steel panels may not require priming. All aluminium and galvanized panels must be primed using Nukote Recommended primers. (Consult NCSI for primers)

APPLICATION:

This material must be applied utilizing high-pressure, heated plural component spray proportioning equipment, such as those manufactured by Graco®, GlasCraft®, Gusmer®. The proportioning equipment utilized must be capable of supplying correct pressure and heat for the appropriate hose length on a consistent basis.

The proportioning equipment shall be capable for heating, mixing, and spray application of polyurethane foam and be able to maintain 1:1 metering with a + 2% variance and adequate main heating capacity to deliver heated and pressurized materials up to 158°F. Heated hose must be able to maintain pre-set temperatures for the full length of the hose. Minimum 2:1 ratio feeder pumps are required to supply stored materials through minimum 12 mm supply hoses. Pressurized and heated tanks systems may be used if sized appropriately to provide adequate flow at maximum operating capacity and temperatures. Spray guns such as **GX-7, GAP Pro Gun and Fusion gun**, are well suited for applications where 10 litres/min or higher volume is desired. These guns may be fitted with smaller output tips (6-8 litres/min.) to perform detail work on pipes, curbs, platforms and parapets etc. Priming is not required for Nukote SPU for most some substrates. Please review your specific project with Nukote technicians. Nukote SPU should be top coated with suitable finishes. The recommended processing temperatures 'Part A' Main 104°-122°F, 'Part B' Main 104°-122°F, Hose 104°-122°F are critical settings to achieve viscosity to allow balanced pressure during spraying. Balanced chemical output pressures are important to produce a good mix. Foam output pressures greater than 14 bar (200 psi) differential indicate either improper chemical temperatures, or worn gun/packing parts... A critical requirement for good spray mixing requires appropriate tip/module sizing to the proportioner and adequate heating capacity.

Nukote SPU Foam *Polyurethane Insulation*

EQUIPMENT CLEANUP:

Cured product may be disposed of without any restrictions. The uncured Isocyanate and resin portions should be mixed together and disposed of in a normal manner. “drip-free” containers should be disposed of according to local environmental laws and ordinances...

LIMITATIONS:

Do not open until ready to use, and store in a sealed container after opening. Adding a nitrogen blanket is strongly recommended for use on the ‘A’ component for storage after opening.

WARNING:

This product contains Isocyanate and curatives

CHEMICAL RESISTANCE:

Each Nukote product formulation has varying levels of resistance to specific chemicals. Please review the chemical immersion test data included in the Nukote Test Book for general resistance to specific chemicals at specific concentration levels. Chemical concentrations are complex and when combined with temperatures above ambient levels this complexity increases exponentially. Contact Nukote Technical Personnel for specific recommendations for chemical resistance prior to specifying these products in this application type. Consult with NCSI for more details on product and chemical resistance. Please consult with NCSI for suitability of Nukote SPU application in chemical contact.

WARRANTIES AND DISCLAIMERS:

Nukote Coating Systems, LLC has no role in the manufacture of the finished polymer other than to supply its two components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of plural component equipment and application of plural component materials. Nukote Coating Systems International, a Nevada Corporation, warrants only that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper mixture and application of the components by the applicator. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Nukote Coating Systems International and executed under seal by a company officer.

NUKOTE ST-M (f)

DESCRIPTION:

Nukote ST-M is NCSI's multipurpose specially formulated polyurea coatings with characteristics and physical properties best suited for applications on substrates where faster gelling time is desired to minimize outgassing and the resultant pinholes, excess sagging and for overhead applications. Nukote ST-M (f) has uses in general as well as various industrial application including mining and mineral processing industries. It is a two-component, 100% solids, pure Polyurea that significantly reduces downtime in new as well as old construction and suitable for Metal, non-metal, SPU, and concrete structures and assets. This aromatic Polyurea Elastomer displays good resistance to a broad range of chemicals including hydrogen Sulphide, methane, excellent thermal stability, abrasion resistance and UV resistance. Nukote ST-M (f) exhibits excellent adhesion to most substrates with or without use of a suitable Nukote primer.

FEATURES

- 100% Solids with zero VOC
- Fast reactivity and cure time resulting in almost immediate return-to-service time
- Can be applied in temperatures from -30°C (-40 °F) and upwards
- Perform in constant temperatures from -30°C to +120°C (40 °F to 250 °F)
- Retains physical properties at -30°C to +120°C(40 °F to 250 °F)
- Excellent elongation properties
- Seamless, resilient, flexible and tough
- Excellent corrosion protection
- Impact, tear and abrasion resistant
- Resistant to many solvents, acids and alkalis (consult NCSI)
- Resistant to Gases and chemicals common to Sewage and Land fills

TYPICAL USES:

- Transportation and Bulk Haulage
- Erosion-corrosion in the milling process
- Pump, Pipe and Piping systems
- Process equipment
- Heap Leach Pads
- Storage Tanks
- Atmospheric corrosion
- Primary and Secondary containment in Acid drainage
- Landfill containment
- Water, waste water and industrial effluent transmission and treatment plants

COLORS:

Standard medium grey, brick red only, custom colors, blended to match any RAL number, are available upon request subject to minimum quantity.

PACKAGING:

Nukote ST-M (f) is available in 380 liter (100 gallons) sets shipped in metal drums of 190 liters (50 gallons) each of Side A and side B or 38 liter (10 Gallons) kits shipped in plastic pails of 19 liters (5 gallons) of side A and 19 liters (5 gallons) of side B, or 2090 tote sets shipped in hardened plastic-metal reinforced UN approved totes of 1045 liters each of side A and side B.

NUKOTE ST-M (f)

TECHNICAL DATA (All values @25 °C)	
Solids by volume	100%
Volatile Organic Compounds	0 gm/ lit
Theoretical coverage@ 1mm (40 mils)	1m ² / lit (40 ft ² / gallon)
Specific Gravity (kg/ liter)	A-1.12, B-1.01 (8.9lbs/gallon)
Viscosity at 25°C in cps (ASTM D 412)	A-260, B-380
Shelf life @ 25°C	12 to 18 Months
Tensile strength (ASTM D 412 C)	22 to 27 MPa (3080-3780 Psi)
Elongation (ASTM D 412)	200-300 %
Hardness ASTM D 2240	50 to 55 Shore D
Flexibility (2mm mandrel ASTM 1737)	Pass
Water Vapour Permeability ASTM E 96	0.361 perm-in
Water Absorption -24 hours (ASTM D 471)	< 0.5%
Crack Bridging @-25°C (ASTM C 836) , 25 cycles	Pass
Tear strength (Die C ASTM 412) (KN/m)	80 to 85(450-500 Pli)
Impact Resistance	> 20 J (200lbs)
Fire Rating , Flame Spread -ASTM E 108	Class 2, Class A for Roof coverings
Flash point Pensky Martin	>93°C
Service temperature (Dry)	-30°C to 120°C (-40°F-250°F)
Abrasion Resistance (ASTM D 4060)	<8 mg loss Taber CS 17 wheel 1Kg/1000 rev
PROCESSING PROPERTIES (Under standard lab conditions)	
Mix Ratio V/V	1:1
Gel time	2 to 4 seconds
Tack free time (DFT & Temperature dependant)	20 to 40 Seconds
Post cure time	24 hours
<i>(The above properties and values are highly dependent on equipment, spray gun, temperature, pressure and related parameters and slight variations are possible). The above values are as per NCSI Standard lab practices & methodology)</i>	

NUKOTE ST-M (f)

COVERAGE:

Nukote ST-M (f) may be applied at any rate to achieve the desired thickness. Calculation for theoretical coverage at 1mm thickness is 1 liter/m² (40 ft²/ gallon).

MIXING:

Nukote ST-M (f) might not be diluted under any circumstance. Use appropriate solvent for purge line and flushing of equipment and if spraying stops for a period of time in excess of the pot life of the material. Thoroughly mix Nukote ST-M (f) part B resin material with air driven power equipment until a homogeneous mixture and color is obtained.

SURFACE PREPARATION:

Concrete:

The surface of a concrete subfloor should be dry, smooth, and structurally sound. It should also be free of depression, scale, or foreign deposits of any kind. Remove all curing compounds. Abrasive blast, sweep blast or water blast to remove all laitance and expose all voids. Use a good quality epoxy filler / mortar for blow hole filling, skim coat or repairs. All concrete subfloors on or below grade level should be tested for moisture. On-grade or below-grade concrete floors should have a moisture barrier installed to protect from ground moisture. The surface preparation of concrete should meet and conform to Joint NACE 6/SSPC-SP 13 Standard

Metal:

All surfaces should be clean and free from contamination. The surface should be assessed and treated in accordance with ISO 8504, Abrasive blast the surface to minimum NACE-2/Sa 2.5, as per ISO 8501-1, for a visual assessment of surface cleanliness with an anchor profile of 75 -100 microns. (3 to 4 mils)

SPU:

Ensure to apply only after the surface is free of trapped moisture in the system.

Refer to NCSI surface preparation manual for more details.

APPLICATION:

This material must be applied utilizing high-pressure, heated plural component spray proportioning equipment, such as those manufactured by Graco® or similar. The proportioning equipment utilized must be capable of supplying correct pressure and heat for the appropriate hose length on a consistent basis.

For optimum performance, the substrate should be abrasive blasted. Concrete substrates should be allowed to cure a minimum of 30 days. On concrete, Nukote ST-M (f) should always be applied over a suitable primer for maximum adhesion. Please review your specific project with Nukote technicians. For all submersed applications, a primer is absolutely essential, after proper preparation. Recommended DFTs are a function of the project, please contact a Nukote technician. On horizontal surface applications, a texture “stipple” coat can be applied for non-skid purposes, after reaching the initial desired film thickness.

EQUIPMENT CLEAN UP:

Cured product may be disposed of without any restrictions. The uncured Isocyanate and resin portions should be mixed together and disposed of in a normal manner. “drip-free” containers should be disposed of according to local environmental laws and ordinances.

NUKOTE ST-M (f)

STORAGE:

Twelve to eighteen months in factory delivered, unopened drums. Keep away from extreme heat, freezing, and moisture. The use of drum heaters is encouraged to reduce material viscosity at low temperatures.

LIMITATIONS:

Do not open until ready to use, and store in a sealed container after opening. Adding a nitrogen blanket is strongly recommended for use on the 'A' component for storage after opening.

WARNING:

This product contains Isocyanate and curatives.

CHEMICAL RESISTANCE:

Each Nukote product formulation has varying levels of resistance to specific chemicals. Please review the chemical immersion test data included in the Nukote Test Book for general resistance to specific chemicals at specific concentration levels. Chemical concentrations are complex and when combined with temperatures above ambient levels this complexity increases exponentially. Contact Nukote Technical Personnel for specific recommendations for chemical resistance prior to specifying these products in this application type. Consult with NCSI for more details on product and chemical resistance. The following chart is the results of Polyurea immersed in chemicals and tested as per ASTM D 3912.

Chemicals	Resistance	Chemicals	Resistance
Hydrochloric acid upto 10%	R	Ammonium Hydroxide 20%	R
Sulphuric Acid 15%	R	Ammonium Hydroxide 50%	RC
Phosporic Acid 10%	R	Pottasium Hydroxide 10%	R
Acetic Acid 10%	R	Pottasium Hydroxide 20%	RC
Sea water	R	Sodium Hydroxide 10%	R
Water @ 80 °C	R	Diesel Fuel, Gasoline (unleaded)	R
Hydrogen Sulphide (gas)	R	Motor Oil, Brake Oil	RC
Sodium Hydroxide-50%	RC	Hydraulic Oil	R

R- Resistant, RC – Slight surface change,discolouration with no loss of hardness.

WARRANTIES AND DISCLAIMERS:

Nukote Coating Systems International, a Nevada, USA Corporation warrants that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper mixture and application of the components by the applicator. Nukote Coating Systems has no role in the application of the finished polymer other than to manufacture and supply its two components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of plural component equipment and application of plural component materials. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Nukote Coating Systems International and executed under seal by a company officer.

NUKOTE IC PRIME

Intercoat Primer

DESCRIPTION:

Nukote IC Prime is a single component, low solids, liquid applied aromatic urethane polyurea primer. It has been specifically designed and blended for use as an intercoat adhesion primer-promoter primarily for Polyurea and elastomeric surfaces. It can be used when the over coating open times of Nukote Polyurea have been exceeded and for overlapping or on aged Polyurea, Polyurethane and Polyurea – Polyurethane hybrids and requiring recoating or repair.

FEATURES

- Fast Re-coat Time
- Excellent Adhesion
- Low Odor
- Low Viscosity

TYPICAL USES:

- Concrete
- Plywood
- Polyurea to Polyurea bonding
- Polyurea to Polyurethane Bonding
- Polyurea to Concrete

COLORS:

Amber

PACKAGING:

Available in 1 Gallon, 5 Gallons and 50 Gallons packages.

MIXING:

Before application, Nukote IC prime must be mixed thoroughly. Closed-top metal cans can be shaken or rolled to mix material.

APPLICATION:

Nukote IC Prime can be applied using an airless sprayer, brush, or Phenolic resin core roller. Apply a thin coat of 1 – 1.5 mils and ensure the entire surface is wetted. Allow Nukote IC Prime to be tack free, dry at 70°F and 50% relative humidity for 30 - 45 minutes before applying the coating. Recommended surface temperature should be greater than 50°F and at least 37.4°F above the dew point. Nukote IC Prime is very sensitive to heat and moisture. Higher temperatures and/or high humidity will significantly accelerate the cure time. Thickness of application, lower temperature and/or low humidity extend the cure time.

EQUIPMENT CLEANUP:

Equipment should be cleaned with an environmentally safe solvent, as permitted under local regulations, immediately after use.

NUKOTE IC PRIME

Intercoat Primer

TECHNICAL DATA (All values @ 77 °F)

Solids by Volume, ASTM D-2369	26%
Volatile Organic Compounds, ASTM D-2369-81	786 grams/liter
Theoretical Coverage Rate @ 1 mil	417 ft ² / gallon (varies with substrate profile)
Specific Gravity (lb/gallon)	8.93
Viscosity @ 75°F	200 ± 20 cps
Shelf Life	6 - 9 months

PROCESSING PROPERTIES (Under standard lab conditions)

Mix Ratio V/V	Single pack
Tack free time (DFT & Temperature dependant)	45 - 60 minutes
Touch dry	1- 2 hours

(The above properties and values are highly dependent on temperature, equipment, and related parameters and slight variations are possible). The above values are as per NCSI Standard lab practices & methodology)

STORAGE:

Nukote IC Prime has a shelf life of one (9) months from date of manufacture in original, factory sealed containers.

LIMITATIONS:

Not UV stable. Surfaces must be dry, clean and free of foreign matter. Containers that have been opened must be used as soon as possible. Nukote IC Prime is difficult to clean up after it has cured. Do not dilute Nukote IC Prime.

WARNING:

This product contains Isocyanate.

WARRANTIES AND DISCLAIMERS:

Nukote Coating Systems, LLC has no role in the manufacture of the finished polymer other than to supply its two components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of plural component equipment and application of plural component materials. Nukote Coating Systems International, a Nevada Corporation, warrants only that the two components of this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper mixture and application of the components by the applicator. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Nukote Coating Systems International and executed under seal by a company officer.



6. NUKOTE PRODUCT TEST RESULTS

Performance Characteristics	Standards	Values
Adhesion	ASTM D4541	
<i>Steel</i>		15 Mpa
<i>Concrete</i>		2.5 Mpa
<i>Wood</i>		1.7 Mpa
Tensile Modulus	ASTM D 412	9.15 Mpa
100%		15 Mpa
300%		
Tensile Elongation	ASTM D 412	400%
Tensile Strength	ASTM D 412	21 Mpa
Durometer Hardness	ASTM D2240	D 45-50
Tear strength	ASTM D 412	80 Kn/m
Salt Spray corrosion	ASTM B117 3000 hours	Blisters –None Pull of adhesion- 14 Mpa. From scribe- 3 mm
Water Vapour Transmission	ASTM E 96	0.02 Perms
Abrasion Resistance	ASTM D4060	1000 g 1000 cycles CS-17 wheel <10 mg loss
Coefficient of Linear Thermal Expansion	ASTM C531 (in/in/°F)	4×10^{-5}
Crack Bridging (@ -26°C (-15°F) @ 1/8")	ASTM C836	Passed
Mandrel Bends Conical Bend (1/32" steel panel)	ASTM D522	Pass
QUV Weatherometer:	ASTM G53, 3000 hours, UVB 313 bulb	Property Retention >93%
Surface Burning Characteristics (Tunnel Test) @ 20.0 mils dft	ASTM E84 Rating: Class1	Flame Spread: 10 Smoke Density: 35
Fire Test of Roof Covering	ASTM E108 (comparable to UL 790)	Class A
Gardner Impact:	ASTM D2794 (1/32" steel panels)	>160 in-lbs, direct and indirect



BAYER CORP.
PHYSICAL TESTING
100 BAYER ROAD
PITTSBURGH, PENNSYLVANIA 15205-9741

TEST REPORT

August 24, 2004

REQUESTOR: WAVT T

REQUEST#:C02036B

SAMPLE ID

NUKOTE ST

8/24/2004 MVT96A S.L. KINGSLEY

E96-95 WATER VAPOR TRANSMISSION E 96, AREA=0.0335FT²
WVT, PERMEANCE, & PERMEABILTY

3.69	3.24	3.47	WVT
9.02	7.68	8.35	PERMC
0.05	0.05	0.05	PERMIN
1.3400	1.1600	1.250	WTCHG
0.0060	0.0065	0.0063	THK
168.00	HRS	168.00	HRS

TEST RESULTS RELATE ONLY TO THE ITEMS TESTED. THIS REPORT
SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE
APPROVAL OF PHYSICAL TESTING.



PHYSICAL PROPERTIES TEST RESULTS SUMMARY
NUKOTE HT AROMATIC PURE POLYUREA

ARCH TEST REFERENCE NUMBER 834213

SEPTEMBER 7, 2004

Physical Property	ASTM Method	HT
Tensile Strength, Mpa	D-412	30.03
Modulus, psi		
100%	D-412	1500
200%		2000
300%		3000
Elongation, %	D-412	451
Tear Strength Die-C, kN/m	D-624	108.5
Split Tear Strength, kN/m	D-470	35.7
Taber Abrasion, mg wt loss (1000 gms, 1000 revs.) CS-17 wheels H-18 wheels	D-4060	12.3 189.8
Tg, ° C	DSC	-49.2
Water Absorption, WT % 24 Hours @ Room Temp.	D-471	0.94
Water Absorption, WT% 24 hours @ Room Temp. 2 Hours @ 95°C	D-570	0.89 0.15
Hardness, Shore D (peak reading)	D-2240	55

TESTING PERFORMED IN ACCORDANCE WITH ASTM REQUIREMENTS



7. NUKOTE SELECTED REFERENCES

CLIENT	PROJECT	SYSTEM	NUKOTE OR PRIVATE LABEL	AREA LF	AREA SF	PRODUCT	REGION	YEAR COMPLETE
New York City Public Works	Manhole Renovations	Primer/Foam/Polyurea (ST System)	Private Label	2100	23100	Pure Polyureas	UNITED STATES	2000
Washington State Sewage Authority	Salmon River Waste Water Basin	Primer/Polyurea (ST System)	Private Label	-	24200	Pure Polyureas	UNITED STATES	2001
Bellingham Public Works	Waste Water Plant Basin	Primer/Polyurea (ST System)	Private Label	-	16231	Pure Polyureas	UNITED STATES	2002
Philadelphia Public Works	Manhole Renovations	Primer/Foam/Polyurea (ST System)	Private Label	3300	36300	Pure Polyureas	UNITED STATES	2002
WSD / CDM	Ngau Tam Mei Water Treatment Plant	Primer/Polyurea (ST System)	Nukote Label	-	42121	Pure Polyureas	HONG KONG	2003
New York City Public Works	Manhole Renovations	Primer/Foam/Polyurea (ST System)	Private Label	1600	17600	Pure Polyureas	UNITED STATES	2003
Beijing Water Ministry	Water Mains Renovation Pipeline Phase I	Primer/Polyurea (ST System)	Nukote Label	-	645600	Pure Polyureas	CHINA	2004
City of Yakima	Yakima Waste Water Digesters	Primer/Polyurea (XT+ System)	Private Label	-	12330	Pure Polyureas	UNITED STATES	2004
Beijing Water Ministry	Water Mains Renovation Phase II	Primer/Polyurea (ST System)	Nukote Label	-	780000	Pure Polyureas	CHINA	2005
Inner Mongolia Baotou Power Plant	Waste Water Containment	Primer/Polyurea (XT+ System)	Nukote Label	-	42560	Pure Polyureas	CHINA	2005
JiangSu Zhejiang Power Plant	Waste Water Containment	Primer/Polyurea (ST System)	Nukote Label	-	78131	Pure Polyureas	CHINA	2005
Abu Dhabi Municipality	Affluent Basins Project	Primer/Polyurea (XT+ System)	Nukote Label	-	126422	Pure Polyureas	GCC	2005
Motuoapa Council	Aeration Wells	Primer/Polyurea (ST System)	Nukote Label	-	12350	Pure Polyureas	NEW ZEALAND	2005
Seattle Metro	West Seattle Pump Stations	Primer/Polyurea (XT+ System)	Private Label	-	15943	Pure Polyureas	UNITED STATES	2005
Japan Gas Company	CCC Sohar Port Manholes & Pump Houses	Primer/Foam/Polyurea (ST System)	Nukote Label	3912	49291.2	Modified Polyureas	OMAN	2006
Hebei Jinhai Power Plant	Waste Water Containment	Primer/Polyurea (ST System)	Nukote Label	-	56417	Pure Polyureas	CHINA	2006
Guandong Region Power Station	Waste Water Containment	Primer/Polyurea (ST System)	Nukote Label	-	123466	Pure Polyureas	CHINA	2006
Newmont Mines	Waste Water Tanks	Primer/Polyurea (ST System)	Nukote Label	-	12189	Pure Polyureas	INDONESIA	2006
Samsung Industries	Water Storage Basins	Primer/Foam/Polyurea (ST System)	Nukote Label	-	287621	Pure Polyureas	KOREA	2006
Tauranga Council	Waste Water Basins and Wet Wlls	Primer/Polyurea (ST System)	Nukote Label	-	15613	Pure Polyureas	NEW ZEALAND	2006
Tabouk Water Authority	Tabouk Water Tanks	Primer/Polyurea (ST System)	Nukote Label	-	33297	Pure Polyureas	SAUDI ARABIA	2006
Ministry of Power & Water R	Coating of Potable Water Flowlines	Primer/Polyurea (ST System)	Nukote Label	-	69113	Aromatic Pure Polyureas	BAHRAIN	2007
Ministry of Defence & Aviation	Potable Water	Primer/Polyurea (ST System)	Nukote Label	-	23456	Aromatic Pure Polyureas	SAUDI ARABIA	2007
Municipal Corp. of Greater Mumbai	Aerator Structures	Primer/Polyurea (XT+ System)	Nukote Label	-	451300	Aromatic Pure Polyureas	INDIA	2008
The Western Corridor	Advanced Water Treatment Facilities	Primer/Polyurea (XT+ System)	Nukote Label	-	117626	Aromatic Pure Polyureas	AUSTRALIA	2008
United Olefins -Sabic	Waste Water Basin	Primer/Polyurea (XT+ System)	Nukote Label	-	66500	Aromatic Pure Polyureas	SAUDI ARABIA	2008

CLIENT	PROJECT	SYSTEM	NUKOTE OR PRIVATE LABEL	AREA LF	AREA SF	PRODUCT	REGION	YEAR COMPLETE
Ministry of Water	Potable Water Tank	Primer/Polyurea (ST System)	Nukote Label	-	32111	Aromatic Pure Polyureas	SAUDI ARABIA	2008
Mitsubishi Heavy Industries	Seawater Cooling Chanel	Primer/Polyurea (ST System)	Nukote Label	-	77100	Aromatic Pure Polyureas	OMAN	2010
Qatar Petroleum - Ras Laffan	Central Cooling Water Basins	Primer/Polyurea (ST System)	Nukote Label	-	711,420	Aromatic Pure Polyureas	DOHA	2010
Marina Bay Sands	Potable Water Storage	Primer/Polyurea (ST System)	Nukote Label	-	4121	Pure Polyureas (Potable Water)	SINGAPORE	2010
Bangalore Water District	Sewage Distribution Pipeline Bangalore, India	Primer/Polyurea (ST System)	Nukote Label	-	2,200,000	Aromatic Pure Polyureas	INDIA	2008-2012



8. MEASUREMENTS AND CONVERSIONS

NUKOTE

MEASUREMENT & CONVERSION CHARTS

<u>When You Know</u>	<u>Multiply By</u>	<u>To Find</u>
Area		
Inches ²	6.45163	Centimeters ²
Centimeters ²	0.155	Inches ²
Feet ²	0.0929	Meters ²
Meters ²	10.76387	Feet ²
Yards ²	0.83613	Meters ²
Meters ²	1.19599	Yards ²
Length		
Inches	0.0254	Meters
Meters	39.37	Inches
Feet	0.3048	Meters
Meters	3.2808	Feet
Yards	0.9144	Meters
Meters	1.09361	Yards
Miles	1.609	Kilometer
Kilometer	0.621	Miles
Weight		
Ounces	28.35	Grams
Grams	0.033527	Ounces
Pounds	0.45359	Kilograms
Kilograms	2.20462	Pounds
Net Ton	0.90719	Metric ton
Metric Ton	1.10231	Net Ton
Gross Ton	1.01605	Metric ton
Metric ton	0.98421	Gross Ton
Slope		
Inch/Floor	8.33	Slope (%)
Centimeters	8.33	Slope (%)
Volume		
Inches ³	0.016387	Liters
Liters	61.023	Inches ³
Feet ³	28.316	Liters
Liters	0.035317	Feet ³
Quarts	0.94636	Liters
Liters	1.05668	Quarts
Gallons	3.78543	Liters
Liters	0.26417	Gallons
Miscellaneous		
Pounds per liner inch	0.1752	Kilonewtons/m
Mega Pascal	145.038	Lbs. per sq. in.
Pounds per gallon	119.7	Grams per litre

NUKOTE

MEASUREMENT & CONVERSION CHARTS

<u>When You Know</u>	<u>Multiply By</u>	<u>To Find</u>
Rate		
Gallons/100 ft ²	0.4075	Liters/m ²
Liters/m ²	2.45399	Gallons/100 ft ²
Pounds/ft ²	4.882	Kilograms/m ²
Kilograms/m ²	0.20483	Pounds/ft ²
Thickness		
Mil	25.4	Microns

HOT TO CALCULATE MIL THICKNESS

Theoretical: 1 litre of 100% solids material applied at 1mm will cover 1 Sq Mtr.

Formula: 1000 Sq.Mtr will require 1000 litres plus the wastage factor.

Measures of Length

12 inches = 1 foot	1 sq. ft = 144 sq. in.
1 sq. yd. = 9 sq. ft.	1sq. mile = 640 acres
1 acre = 4840 sq.yd. = 43,560 sq. ft.	
100 mm ² = 1 cm ²	10, 000 cm ² = 1m ²

Measures of Weight

16 ounces = 1 pound	1000 grams = 1 kg
2000 pounds = 1 net ton	1000 kg = 1 metric ton

Sealant Estimation

Linear meters per full litre

		6.4	9.5	12.7	15.9	19.1	22.2	25.4
Depth of Joint (mm)	6.4	93.9	62.5	46.9	37.5	31.1	26.8	23.5
	9.5	62.5	41.5	31.1	25	20.7	17.7	15.5
	12.7	46.9	31.1	23.5	18.6	15.5	13.4	11.6
	15.9	37.5	25	18.6	14.9	12.5	10.7	9.14
	19.1	31.1	20.7	15.5	12.5	10.4	8.84	7.62
	22.2	26.8	17.7	13.4	10.7	8.84	7.62	6.71
	25.4	23.5	15.5	11.6	9.14	7.62	6.17	5.79

Coverage and yields shown do not include allowances for loss or waste and variations in job conditions. Each user must establish his own factors for loss from experience.



9. MATERIAL SAFETY DATA SHEETS

SECTION VI - HEALTH HAZARD DATA

SKIN CONTACT: Frequent and prolonged contact can cause irritation and/or contact dermatitis. Remove contaminated clothes and footwear and wash with plenty of water. Seek Medical attention in the event of irritation.

EYE CONTACT: Can irritate eyes. Wash with plenty of water if product comes in contact with eyes. Seek medical attention if pain or irritation persists. Repeated or prolonged exposure may produce conjunctivitis.

SKIN ABSORPTION: Systemically concentrations of this product will probably not be absorbed through human skin. Entry into blood streams through cuts and abrasion or lesions may produce systemic injury with harmful effects. Protect skin damages of any kind

INGESTION: Not Classified as Harmful by ingestion. However Irritation of the mouth, pharynx, esophagus and stomach can develop following ingestion. Gastro intestinal tract discomfort may cause vomiting and nausea. Drink plenty of water if swallowed

INHALATION: The material not thought to produce adverse health effects or irritation of respiratory track. Nevertheless avoid overexposure may induce headaches, dizziness, drowsiness.

HEALTH HAZARDS: ACUTE: None known. **CHRONIC:** Repeated exposure above current occupational limits is not thought to produce or cause any adverse effects. Nevertheless minimize exposure with PPS

CARCINOGENICITY: Not Known, Not classified

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Asthma or asthmatic bronchitis, allergic disease, respiratory disease, sinusitis, headache, vomiting and dizziness.

EMERGENCY AND FIRST AID PROCEDURES:

EYE CONTACT: Immediately flush eyes with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Have eyes examined and treated by medical personnel.

INHALATION: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is labored, give oxygen. Consult medical personnel.

SKIN CONTACT: Wash material off the skin with plenty of soap and water. If redness, itching, or a burning sensation develops, get medical attention. Wash contaminated clothing and de contaminate the footwear before reuse.

INGESTION: Do not induce vomiting. Give 1 or 2 glasses of water to drink and refer person to medical personnel. Never give anything by mouth to an unconscious person.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear skin, eye, and respiratory protection during cleanup. Soak up material with absorbent and shovel into a chemical waste container. Cover container, but do not seal, and remove from work area. Residues from spill cleanup may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, call CHEMTREC (Chemical Transportation Emergency Center) at 800-424-9300.

WASTE DISPOSAL METHOD: Residues may still be subject to RCRA storage and disposal requirements. Dispose off in compliance with all relevant local, state, and federal laws and regulations regarding treatment.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in tightly sealed containers to protect from atmospheric moisture. Store in a cool, dry, well ventilated area. Protect containers against physical damage and check for leaks.

OTHER PRECAUTIONS: Prevent skin and eye contact, observe TLV limitations. Avoid breathing vapors. Workers should shower and change to fresh clothing after each shift.

SECTION VIII - CONTROL MEASURES

VENTILATION: General ventilation is recommended during normal use. Local ventilation may be required during certain operations to prevent inhalation of vapors.

RESPIRATORY PROTECTION: Not generally required during normal use and handling. The need for respiratory protection should be evaluated if this material is sprayed or heated in poorly ventilated areas.

PROTECTIVE CLOTHING: Gloves determined to be impervious under the conditions of use should be worn always when working with this product. Depending on conditions of use, additional protection may be required such as apron, arm covers, or full body suit. Wash

contaminated clothing before re-wearing. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

EYE PROTECTION: Chemical tight goggles with side shields .Soft contact lens may absorb and concentrate irritants. Observe the company Policy on contact lens wear.

OTHER PROTECTIVE EQUIPMENT AND MEASURES: Wear protective clothing to prevent skin contact. Unhindered access to safety shower and eye wash stations including barrier cream, skin cleansing cream. As a general hygienic practice, wash hands and face after use. Showers and cleaning of clothes are recommended.

SECTION IX - REGULATORY INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: Not regulated.

IMO PROPER SHIPPING NAME: Not regulated.

STATE REGULATIONS: CALIFORNIA As per requirements of the Safe Drinking Water & Toxic Enforcement Act of CA, USA 1985 (Proposition 65), the public is warned that materials used in this product may create an exposure to chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. This warning required by Section 25249.6 of the California Health and Safety Code.

TOXIC SUBSTANCE CONTROL ACT: All chemicals comprising this product are listed on the TSCA inventory.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: NUKOTE HPT, Concrete Treatment

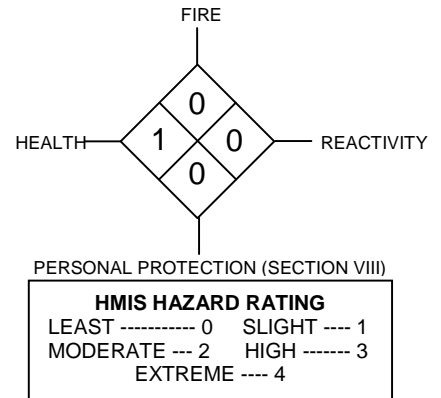
SECTION I - COMPANY IDENTIFICATION

COMPANY NAME: Nukote Coating Systems International LLC

ADDRESS: 8550 W. Desert Inn Road, Suite 102-652, Las Vegas, NV 89117, USA

EMERGENCY CONTACT: (CHEMTREC): 800-424-9300
Outside USA and Canada, call CHEMTREC collect: 703-527-3887

DATE REVISED: August 25, 2010



SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

HAZARDOUS COMPONENTS: None

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: >127.7°C (261.8°F)

SPECIFIC GRAVITY: 1.10 g/cm³

COATING V.O.C.: Zero

pH: ± 12

APPEARANCE AND ODOR: Cloudy white liquid with no odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: NA

METHOD USED: N/A

FLAMMABLE LIMITS IN AIR BY VOLUME: Lower: N/A Upper: N/A

EXTINGUISHING MEDIA: No restriction on type of extinguisher.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

SECTION V - REACTIVITY DATA

STABILITY: Stable under normal conditions.

CONDITIONS TO AVOID: Avoid heating closed container.

INCOMPATIBILITY (MATERIALS TO AVOID): Strong acids.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: None.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VI - HEALTH HAZARD DATA

PRIMARY ROUTES OF EXPOSURE: Eye or Skin contact

SIGNS/ SYMPTOMS: Irritation and/or redness of mucous membranes around the eyes.

TOXICITY: Nukote HPT is non toxic but ingestion is not recommended.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Dilute and flush with water.

ECOTOXICITY: Environmentally neutral – safe for disposal into storm water system.

STORAGE: Store away from incompatible materials, i.e strong acids.

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION: Face mask recommended during application.

PROTECTIVE CLOTHING: None

OTHER PROTECTIVE EQUIPMENT AND MEASURES: An Eyewash station should be nearby, ready for use.

SECTION IX - REGULATORY INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: Not regulated.

IMO PROPER SHIPPING NAME: Not regulated.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Nukote Polyprime II, Side-A ISO

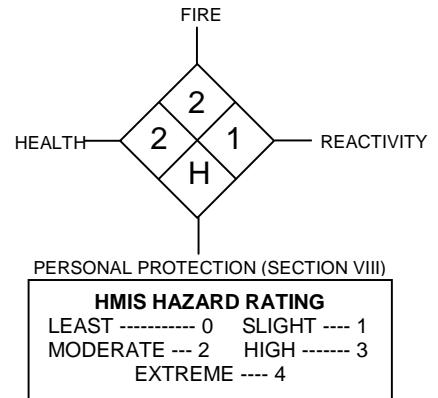
SECTION I - COMPANY IDENTIFICATION

COMPANY NAME: Nukote Coating Systems International LLC

ADDRESS: 8550 W. Desert Inn Road, Suite 102-652, Las Vegas, NV 89117, USA

EMERGENCY CONTACT: (CHEMTREC): 800-424-9300
Outside USA and Canada, call CHEMTREC collect: 703-527-3887

DATE REVISED: August 27, 2010



SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

HAZARDOUS COMPONENTS	CAS NUMBER	OCCUPATIONAL EXPOSURE LIMITS			VAPOR PRESSURE	
		OSHA PEL	ACGIH TLV	MFG TLV	mm	Hg @ TEMP
*AROMATIC NAPHTHA	64742-95-6	25 ppm	25 ppm		4.8	38°C (100°F)
*4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	.02 ppm (CEILING)	.005 ppm		<5.0	25°C (77°F)
*N-METHYL-2-PROLIDINONE	872-50-4	N/E	N/E			

* Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.
Information concerning non-hazardous ingredients is considered a Trade Secret.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: >138°C (280°F)

SPECIFIC GRAVITY: (H₂O=1):1.07

COATING V.O.C. (Combined Side-A & Side-B): 200 g/l (1.67 lb/gal)

VAPOR DENSITY: N/A

EVAPORATION RATE: Slower than ether

SOLUBILITY IN WATER: Reacts with water

APPEARANCE AND ODOR: Thin black liquid, aromatic odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 42°C (108°F)

METHOD USED: TCC

FLAMMABLE LIMITS IN AIR BY VOLUME: (Based on Aromatic Naphtha)

Lower: 1.9% Upper: 12.3%

EXTINGUISHING MEDIA: Dry chemical, foam, carbon dioxide. If water is used, use very large quantities of cold water. The reaction between water and hot isocyanate may be vigorous.

SPECIAL FIRE FIGHTING PROCEDURES: Wear NIOSH approved self-contained breathing apparatus in positive pressure mode with full-face piece. Boots, gloves (neoprene), goggles, and full protective clothing are also required. Excessive pressure or temperature may cause explosive rupture of containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Water contamination will produce carbon dioxide. Do not reseal contaminated containers as pressure buildup may rupture them. Combustible.

SECTION V - REACTIVITY DATA

STABILITY: Stable under normal conditions.

CONDITIONS TO AVOID: Heat, high temperature, open flame, sparks, and moisture. Contact with incompatible materials in a closed system will cause liberation of carbon dioxide and buildup of pressure.

INCOMPATIBILITY (MATERIALS TO AVOID): This product will react with any material containing active hydrogens, such as water, alcohol, ammonia, amines, alkalis and acids, the reaction with water is slow under 50°C, but is accelerated at higher temperature and in

the presence of alkalis, tertiary amines, and metal compounds. Some reactions can be violent. Material can react violently with strong oxidizing agents.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon dioxide, carbon monoxide, nitrogen oxides, traces amounts of hydrogen cyanide and unidentified organic compounds may be formed during combustion.

HAZARDOUS POLYMERIZATION: May occur. High temperatures, above 207°C (400°F) in the presence of moisture alkalis, tertiary amines, and metal compounds will accelerate polymerization. Possible evolution of carbon dioxide gas may rupture closed containers.

SECTION VI - HEALTH HAZARD DATA

SKIN CONTACT: Some components used in this material when spilled on the skin may cause irritation, redness, swelling, or blistering. Repeated contact may cause irritation of the skin and an allergic skin reaction consisting of a hive-like rash on locations not even directly contacted by the liquid. Individuals who have developed a skin sensitization can develop these symptoms as a result of contact with very small amounts of liquid material or as a result of exposure to vapor.

EYE CONTACT: Liquid, aerosols or vapors are severely irritating and can cause pain, tearing, reddening and swelling. The effects of liquid directly contacting the eye can lead to possible damage to the cornea and impairment of vision. The effects of high vapor concentration may vary from slight irritation with tearing and burning sensation to keratitis consisting of inflammation of the cornea and impairment of vision. Any level of contact should not be left untreated.

SKIN ABSORPTION: Systemically toxic concentrations of this product will probably not be absorbed through human skin.

INGESTION: Can result in irritating and corrosive action in the mouth, stomach tissue and digestive tract and gastroenteritis. Symptoms can include sore throat, headache, abdominal pain, nausea, vomiting and diarrhea. Pronounced gastroenteritis effects would probably occur on repeated ingestion.

INHALATION: Isocyanate vapors or mist at concentrations above the TLV can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). High vapor concentrations may cause central nervous system (CNS) depression as evidenced by giddiness, headache, dizziness, and nausea. Persons with a preexisting, non-specific bronchial hyperactivity can respond to concentrations below the TLV with similar symptoms as well as asthma attack. Exposure well above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). As a result of previous repeated overexposures or a single large dose, certain individuals may develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Chronic overexposure to isocyanate has also been reported to cause lung damage (including decrease in lung function) which may be permanent. Sensitization can either be temporary or permanent.

HEALTH HAZARDS: ACUTE: Exposure may cause mucous membrane and respiratory tract irritation, tightness of chest, headache, shortness of breath, and a dry cough. At concentrations exceeding current occupational limits and for sensitized individuals at levels less than or greater than current occupational limits, asthma-like symptoms may occur. These symptoms may include coughing, wheezing, and shortness of breath. A hypersensitive pneumonitis may also occur if the person is sensitized. This syndrome is characterized by fever, nonproductive cough, wheezing, chills, and shortness of breath. Central nervous system (CNS) depression may also result. The effects of acute exposure may be delayed in onset up to 12-24 hours. **CHRONIC:** Repeated exposure above current occupational limits may cause an allergic sensitization of the respiratory tract. This is characterized by an asthma-like response upon re-exposure to the chemical. The symptoms may include coughing, wheezing, shortness of breath and chest tightness, and may be fatal. Central nervous system (CNS) impairment leading to unconsciousness and fatality may occur in extreme cases.

CARCINOGENICITY: NTP: No IARC Monographs: Yes OSHA Regulated: No
IARC classifies carbon black as a category 2B carcinogen (known animal carcinogen, possible human carcinogen) based on inhalation studies. Because this product is a free-flowing liquid or paste, dust inhalation is not an expected route of exposure. Sanding cured product can result in exposure to carbon black dusting.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Cardiovascular disease, asthma or asthmatic bronchitis, emphysema, allergic disease, chronic respiratory disease, sinusitis, headache and dizziness.

EMERGENCY AND FIRST AID PROCEDURES: EYE CONTACT: Immediately flush eyes with plenty of water, preferably lukewarm. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Have eyes examined and treated by medical personnel. **INHALATION:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is labored, give oxygen. Consult medical personnel. **SKIN CONTACT:** Wash material off the skin thoroughly with plenty of soap and water. If redness, itching, or a burning sensation develops, get medical attention. Wash contaminated clothing and decontaminates footwear before reuse. **INGESTION:** Do not induce vomiting. Immediately drink large quantities of water and refer person to medical personnel. Do not give anything by mouth to an unconscious person.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear skin, eye, and respiratory protection during cleanup. Soak up material with absorbent and shovel into a chemical waste container. Cover container, but do not seal, and remove from work area. Prepare a decontamination solution of 2.0% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Follow the precautions on the supplier's material safety data sheets. All operations should be performed by trained personnel familiar with the hazards of the chemicals used. Treat the spill area with the decontamination solution, using about 10 parts of solution for each part of the spill, and allow it to react for at least 15 minutes. Carbon dioxide will be evolved, leaving insoluble polyureas. Residues from spill cleanup, even when treated as described may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, call CHEMTREC (Chemical Transportation Emergency Center) at 800-424-9300.

WASTE DISPOSAL METHOD: Slowly stir the isocyanate waste into the decontamination solution described above. Let stand for 48 hours, allowing the evolved carbon dioxide to vent away, residues may still be subject to RCRA storage and disposal requirements. Dispose off in compliance with all relevant local, state, and federal laws and regulations regarding treatment.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep in cool, dry, ventilated storage area, in closed containers and out of direct sunlight. Keep liquid and vapors away from heat, sparks and flame, store in containers above ground and surrounded by dikes to contain spills or leaks. Sufficient heat or pressure may ignite or detonate even liquid product in the absence of sparks or open flame. Extinguish pilot lights, cigarettes and turn off other sources of ignition before use and until all vapors are gone. Vapors may accumulate and travel to ignition sources distant from the handling site; flash fire can result. Keep containers closed when not in use. Containers, even those that have been emptied, may contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. Do not pressurize containers to empty them. Use explosion-proof lighting and equipment, non-sparking tools, clothes and shoes. Ground all structures, transfer containers and equipment to conform to the national electrical code. Use procedures which prevent static electrical sparks. Static electricity may accumulate and create a fire hazard.

OTHER PRECAUTIONS: Prevent skin and eye contact, observe TLV limitations. Avoid breathing vapors. Workers should shower and change to fresh clothing after each shift. A sensitized individual should not be exposed to the product that caused the sensitization. Air circulation and exhaustion of product vapors must be maintained until the coatings have fully cured to insure that no potential fire, explosion or health hazard remains. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent chronic overexposure from inhalation. This product can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposure to lower concentrations. Exposure to vapors of heated products can be extremely dangerous. Employee education and training in safe handling of this material is required under OSHA hazard communication standard. Individuals with existing respiratory disease such as chronic bronchitis, emphysema, or asthma should not be exposed to products. These individuals should be identified through baseline and annual evaluation and removed from further exposure. Medical examination should include medical history, vital capacity, and forced expiratory volume at one second.

SECTION VIII - CONTROL MEASURES

VENTILATION: The use of mechanical dilution ventilation is recommended whenever this product is used in a confined space, is heated above ambient temperatures, or is agitated. Use explosion-proof ventilation equipment. Use local exhaust ventilation to keep airborne concentrations below the TLV. Follow guidelines in the ACGIH publication "Industrial Ventilation". Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination.

RESPIRATORY PROTECTION: If airborne concentrations exceed or are expected to exceed the TLV, use MSHA/NIOSH approved positive pressure supplied air respirator with a full face piece or an air supplied hood. For emergencies, use a positive pressure self-contained breathing apparatus. Air purifying (cartridge type) respirators are not approved for protection against isocyanates.

PROTECTIVE CLOTHING: Gloves determined to be impervious under the conditions of use should be worn always when working with this product. Depending on conditions of use, additional protection may be required such as apron, arm covers, or full body suit. Wash contaminated clothing before re-wearing. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

EYE PROTECTION: Chemical tight goggles and full-face shield.

OTHER PROTECTIVE EQUIPMENT AND MEASURES: Unhindered access to safety shower and eye wash stations. As a general hygienic practice, wash hands and face after use. Showers and cleaning of clothes are recommended. Follow all label instructions. Educate and train employees in safe use of product.

SECTION IX - REGULATORY INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: UN 1263, Paint, Class 3, PG III, Flammable Liquid.

IMO PROPER SHIPPING NAME: UN 1263, Paint, Class 3, PG III, Flammable Liquid.

STATE REGULATIONS: CALIFORNIA - As per requirements of the Safe Drinking Water & Toxic Enforcement Act of CA, USA 1985 (Proposition 65), the public is warned that materials used in this product may create an exposure to chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. This warning required by Section 25249.6 of the California Health and Safety Code.

TOXIC SUBSTANCE CONTROL ACT: All chemicals comprising this product are listed on the TSCA inventory.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Nukote Polyprime II, Side-B RESIN

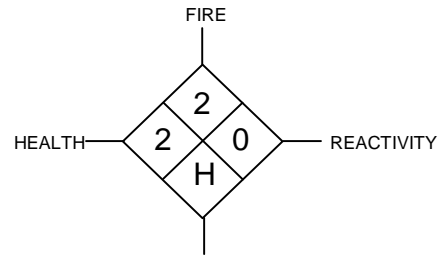
SECTION I - COMPANY IDENTIFICATION

COMPANY NAME: Nukote Coating Systems International LLC

ADDRESS: 8550 W. Desert Inn Road, Suite 102-652, Las Vegas, NV 89117, USA

EMERGENCY CONTACT: (CHEMTREC): 800-424-9300
Outside USA and Canada, call CHEMTREC collect: 703-527-3887

DATE REVISED: August 27, 2010



PERSONAL PROTECTION (SECTION VIII)

HMIS HAZARD RATING
LEAST ----- 0 SLIGHT ---- 1
MODERATE --- 2 HIGH ----- 3
EXTREME ---- 4

SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

HAZARDOUS COMPONENTS	OCCUPATIONAL EXPOSURE LIMITS			MFG TLV	VAPOR PRESSURE	
	CAS NUMBER	OSHA PEL	ACGIH TLV		mm	Hg @ TEMP
*AROMATIC NAPHTHA	64742-95-6	25 ppm	25 ppm		4.8	38°C (100°F)
*N-METHYL-2-PROLIDINONE	872-50-4	N/E	N/E			

* Indicates toxic chemical(s) subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372.
Information concerning non-hazardous ingredients is considered a Trade Secret.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: >250°F

SPECIFIC GRAVITY: (H₂O=1): 0.965

COATING V.O.C. (Combined Side-A & Side-B): 200 g/l (1.67 lb/gal)

VAPOR DENSITY: Heavier than air

EVAPORATION RATE: Slower than ether

SOLUBILITY IN WATER: N/A

APPEARANCE AND ODOR: Thin liquid, aromatic odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 42°C (108°F)

METHOD USED: TCC

FLAMMABLE LIMITS IN AIR BY VOLUME: (Based on Aromatic Naphtha)

Lower: 1.9% Upper: 12.3%

EXTINGUISHING MEDIA: Dry chemical, foam, carbon dioxide, water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Wear NIOSH approved self contained breathing apparatus in positive pressure mode with full face piece. Boots, gloves (neoprene), goggles, and full protective clothing are also required.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Closed containers may rupture due to very high temperature or induced pressure.

SECTION V - REACTIVITY DATA

STABILITY: Stable under normal conditions in closed containers.

CONDITIONS TO AVOID: Heat, high temperature, open flame, sparks, and moisture. Contact with incompatible materials in a closed system will cause buildup of pressure.

INCOMPATIBILITY (MATERIALS TO AVOID): This product will react with isocyanates, and strong oxidizing agents.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Organic vapors and other thermal decomposition products.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VI - HEALTH HAZARD DATA

SKIN CONTACT: Severe skin irritant. May cause skin sensitization.

EYE CONTACT: Severe eye irritant. Burns of the eye may cause blindness. Any level of contact should not be left untreated.

SKIN ABSORPTION: Systemically toxic concentrations of this product will probably not be absorbed through human skin. May cause nausea, headache, and general discomfort.

INGESTION: Irritation or chemical burns of the mouth, pharynx, esophagus and stomach can develop following ingestion, and injury may be severe leading to death unless treated promptly.

INHALATION: Vapors can irritate eyes, nose and respiratory passages. Over exposure may induce headaches, dizziness, drowsiness or unconsciousness may severely damage contacted tissue and produce scarring. Chronic exposures may result in permanent decreases in lung function. High vapor concentrations may cause central nervous system (CNS) depression as evidenced by giddiness, headache, dizziness, and nausea.

HEALTH HAZARDS: ACUTE: Exposure may cause mucous membrane and respiratory tract irritation, tightness of chest, headache, shortness of breath, and a dry cough. Early to moderate CNS depression may result. The effects of acute exposure may be delayed in onset up to 12-24 hours. **CHRONIC:** Repeated exposure above current occupational limits may cause an allergic sensitization of the respiratory tract. This is characterized by an asthma-like response upon re-exposure to the chemical. The symptoms may include coughing, wheezing, shortness of breath and chest tightness, and may be fatal in extreme cases of CNS depression unconsciousness may occur.

CARCINOGENICITY: NTP: No

IARC Monographs: No

OSHA Regulated: No

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Cardiovascular disease, asthma or asthmatic bronchitis, eye and skin disorder, allergic disease, chronic respiratory disease, sinusitis, headache, dizziness.

EMERGENCY AND FIRST AID PROCEDURES: EYE CONTACT: Immediately flush eyes with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Have eyes examined and treated by medical personnel. **INHALATION:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is labored, give oxygen. Consult medical personnel. **SKIN CONTACT:** Wash material off the skin with plenty of soap and water. If redness, itching, or a burning sensation develops, get medical attention. Wash contaminated clothing and decontaminate footwear before reuse. **INGESTION:** Do not induce vomiting. Give 1 or 2 glasses of water to drink and refer person to medical personnel. Never give anything by mouth to an unconscious person.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear skin, eye, and respiratory protection during cleanup. Soak up material with absorbent and shovel into a chemical waste container. Cover container and remove from work area. Residues from spill cleanup may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, call CHEMTREC (Chemical Transportation Emergency Center) at 800-424-9300.

WASTE DISPOSAL METHOD: Spill cleanup residues may still be subject to RCRA storage and disposal requirements. Dispose off in compliance with all relevant local, state, and federal laws and regulations regarding treatment.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep in cool, dry, ventilated storage area, in closed containers and out of direct sunlight. Keep liquid and vapors away from heat, sparks and flame, store in containers above ground and surrounded by dikes to contain spills or leaks. Sufficient heat or pressure may ignite or detonate even liquid product in the absence of sparks or open flame. Extinguish pilot lights, cigarettes and turn off other sources of ignition before use and until all vapors are gone. Vapors may accumulate and travel to ignition sources distant from the handling site; flash fire can result. Keep containers closed when not in use. Containers, even those that have been emptied, may contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. Do not pressurize containers to empty them. Use explosion-proof lighting and equipment, non-sparking tools, clothes and shoes. Ground all structures, transfer containers and equipment to conform to the national electrical code. Use procedures that prevent static electrical sparks. Static electricity may accumulate and create a fire hazard.

OTHER PRECAUTIONS: Prevent skin and eye contact, observe TLV limitations. Avoid breathing vapors. Workers should shower and change to fresh clothing after each shift. A sensitized individual should not be exposed to the product that caused the sensitization. Air circulation and exhaustion of vapors must be maintained until the coatings have fully cured to insure that no potential fire, explosion or health hazard remains.

SECTION VIII - CONTROL MEASURES

VENTILATION: The use of mechanical dilution ventilation is recommended whenever this product is used in a confined space, is heated above ambient temperatures, or is agitated. Use explosion-proof ventilation equipment. Use local exhaust ventilation to keep airborne concentrations below the TLV. Follow guidelines in the ACGIH publication 'Industrial Ventilation'. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination.

RESPIRATORY PROTECTION: Avoid prolonged or repeated breathing of vapors. If exposure may or does exceed occupational exposure limits (Sec. II) use a NIOSH-approved respirator to prevent overexposure. In accordance with 29 CFR 1910.134 use either an atmosphere-supplying respirator or an air-purifying respirator for organic vapors. OSHA has established transitional occupational exposure limits for this product and/or components of this product. Refer to 29 CFR 1910.1000 for these transitional limits and requirements for meeting these limits.

PROTECTIVE CLOTHING: Gloves determined to be impervious under the conditions of use should be worn always when working with this product. Depending on conditions of use, additional protection may be required such as apron, arm covers, or full body suit. Wash contaminated clothing before re-wearing. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

EYE PROTECTION: Chemical tight goggles and full-face shield.

OTHER PROTECTIVE EQUIPMENT AND MEASURES: Unhindered access to safety shower and eye wash stations. As a general hygienic practice, wash hands and face after use. Showers and cleaning of clothes are recommended.

SECTION IX - REGULATORY INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: UN 1263, Paint, Class 3, PG III, Flammable Liquid.

IMO PROPER SHIPPING NAME: UN 1263, Paint, Class 3, PG III, Flammable Liquid.

STATE REGULATIONS: CALIFORNIA - As per requirements of the Safe Drinking Water & Toxic Enforcement Act of CA, USA, 1985 (Proposition 65), the public is warned that materials used in this product may create an exposure to chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. This warning required by Section 25249.6 of the California Health and Safety Code.

TOXIC SUBSTANCE CONTROL ACT: All chemicals comprising this product are listed on the TSCA inventory.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Nukote IC Prime

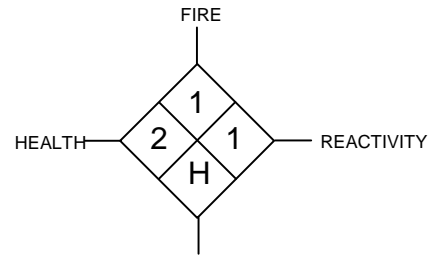
SECTION I - COMPANY IDENTIFICATION

COMPANY NAME: Nukote Coating Systems International LLC

ADDRESS: 8550 W. Desert Inn Road, Suite 102-652, Las Vegas, NV 89117, USA

EMERGENCY CONTACT: (CHEMTREC): 800-424-9300
Outside USA and Canada, call CHEMTREC collect: 703-527-3887

DATE REVISED: August 20, 2010



PERSONAL PROTECTION (SECTION VIII)

HMIS HAZARD RATING
LEAST ----- 0 SLIGHT ---- 1
MODERATE --- 2 HIGH ----- 3
EXTREME ---- 4

SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

HAZARDOUS COMPONENTS	OCCUPATIONAL EXPOSURE LIMITS				VAPOR PRESSURE		
	CAS NUMBER	OSHA PEL	ACGIH TLV	MFG TLV	mm Hg @ TEMP	% By Weight	
*4, 4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	.02 ppm (CEILING)	.005 ppm		<5.0 25°C (77°F)	35 – 50%	
*N-METHYL-2-PROLIDINONE	872-50-4	N/E	N/E			3 – 10%	

* Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.
Information concerning non-hazardous ingredients is considered a Trade Secret.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: >196°C (385°F)

SPECIFIC GRAVITY: (H₂O=1):1.09

COATING V.O.C.: 786 g/l (6.57 lb/gal)

VAPOR DENSITY: N/A

EVAPORATION RATE: Slower than ether

SOLUBILITY IN WATER: Reacts with water

APPEARANCE AND ODOR: Amber liquid, aromatic odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: >93°C (199°F)

METHOD USED: TCC

FLAMMABLE LIMITS IN AIR BY VOLUME: (Based on N-MTHYL-2PRROLIDINONE) Lower: 1.3% Upper: 9.5%

EXTINGUISHING MEDIA: Dry chemical, foam, carbon dioxide. If water is used, use very large quantities of cold water. The reaction between water and hot isocyanate may be vigorous.

SPECIAL FIRE FIGHTING PROCEDURES: Wear NIOSH approved self-contained breathing apparatus in positive pressure mode with full-face piece. Boots, gloves (neoprene), goggles, and full protective clothing are also required. Excessive pressure or temperature may cause explosive rupture of containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Water contamination will produce carbon dioxide. Do not reseal contaminated containers as pressure buildup may rupture them. Combustible.

SECTION V - REACTIVITY DATA

STABILITY: Stable under normal conditions.

CONDITIONS TO AVOID: Heat, high temperature, open flame, sparks, and moisture. Contact with incompatible materials in a closed system will cause liberation of carbon dioxide and buildup of pressure.

INCOMPATIBILITY (MATERIALS TO AVOID): This product will react with any material containing active hydrogens, such as water, alcohol, ammonia, amines, alkalis and acids, the reaction with water is slow under 50°C, but is accelerated at higher temperature and in the presence of alkalis, tertiary amines, and metal compounds. Some reactions can be violent. Material can react violently with strong oxidizing agents.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon dioxide, carbon monoxide, nitrogen oxides, traces amounts of hydrogen cyanide and unidentified organic compounds may be formed during combustion.

HAZARDOUS POLYMERIZATION: May occur. High temperatures, above 207°C (400°F) in the presence of moisture alkalis, tertiary amines, and metal compounds will accelerate polymerization. Possible evolution of carbon dioxide gas may rupture closed containers.

SECTION VI - HEALTH HAZARD DATA

SKIN CONTACT: Some components used in this material when spilled on the skin may cause irritation, redness, swelling, or blistering. Repeated contact may cause irritation of the skin and an allergic skin reaction consisting of a hive-like rash on locations not even directly contacted by the liquid. Individuals who have developed a skin sensitization can develop these symptoms as a result of contact with very small amounts of liquid material or as a result of exposure to vapor.

EYE CONTACT: Liquid, aerosols or vapors are severely irritating and can cause pain, tearing, reddening and swelling. The effects of liquid directly contacting the eye can lead to possible damage to the cornea and impairment of vision. The effects of high vapor concentration may vary from slight irritation with tearing and burning sensation to keratitis consisting of inflammation of the cornea and impairment of vision. Any level of contact should not be left untreated.

SKIN ABSORPTION: Systemically toxic concentrations of this product will probably not be absorbed through human skin.

INGESTION: Can result in irritating and corrosive action in the mouth, stomach tissue and digestive tract and gastroenteritis. Symptoms can include sore throat, headache, abdominal pain, nausea, vomiting and diarrhea. Pronounced gastroenteritis effects would probably occur on repeated ingestion.

INHALATION: Isocyanate vapors or mist at concentrations above the TLV can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). High vapor concentrations may cause central nervous system (CNS) depression as evidenced by giddiness, headache, dizziness, and nausea. Persons with a preexisting, non-specific bronchial hyperactivity can respond to concentrations below the TLV with similar symptoms as well as asthma attack. Exposure well above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). As a result of previous repeated overexposures or a single large dose, certain individuals may develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Chronic overexposure to isocyanate has also been reported to cause lung damage (including decrease in lung function) which may be permanent. Sensitization can either be temporary or permanent.

HEALTH HAZARDS: ACUTE: Exposure may cause mucous membrane and respiratory tract irritation, tightness of chest, headache, shortness of breath, and a dry cough. At concentrations exceeding current occupational limits and for sensitized individuals at levels less than or greater than current occupational limits, asthma-like symptoms may occur. These symptoms may include coughing, wheezing, and shortness of breath. A hypersensitive pneumonitis may also occur if the person is sensitized. This syndrome is characterized by fever, nonproductive cough, wheezing, chills, and shortness of breath. Central nervous system (CNS) depression may also result. The effects of acute exposure may be delayed in onset up to 12-24 hours. **CHRONIC:** Repeated exposure above current occupational limits may cause an allergic sensitization of the respiratory tract. This is characterized by an asthma-like response upon re-exposure to the chemical. The symptoms may include coughing, wheezing, shortness of breath and chest tightness, and may be fatal. Central nervous system (CNS) impairment leading to unconsciousness and fatality may occur in extreme cases.

CARCINOGENICITY: NTP: No IARC Monographs: No OSHA Regulated: No

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Cardiovascular disease, asthma or asthmatic bronchitis, emphysema, allergic disease, chronic respiratory disease, sinusitis, headache and dizziness.

EMERGENCY AND FIRST AID PROCEDURES: EYE CONTACT: Immediately flush eyes with plenty of water, preferably lukewarm. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Have eyes examined and treated by medical personnel. **INHALATION:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is labored, give oxygen. Consult medical personnel. **SKIN CONTACT:** Wash material off the skin thoroughly with plenty of soap and water. If redness, itching, or a burning sensation develops, get medical attention. Wash contaminated clothing and decontaminates footwear before reuse. **INGESTION:** Do not induce vomiting. Immediately drink large quantities of water and refer person to medical personnel. Do not give anything by mouth to an unconscious person.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear skin, eye, and respiratory protection during cleanup. Soak up material with absorbent and shovel into a chemical waste container. Cover container, but do not seal, and remove from work area. Prepare a decontamination solution of 2.0% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Follow the precautions on the supplier's material safety data sheets. All operations should be performed by trained personnel familiar with the hazards of the chemicals used. Treat the spill area

with the decontamination solution, using about 10 parts of solution for each part of the spill, and allow it to react for at least 15 minutes. Carbon dioxide will be evolved, leaving insoluble polyureas. Residues from spill cleanup, even when treated as described may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, call CHEMTREC (Chemical Transportation Emergency Center) at 800-424-9300.

WASTE DISPOSAL METHOD: Slowly stir the isocyanate waste into the decontamination solution described above. Let stand for 48 hours, allowing the evolved carbon dioxide to vent away, residues may still be subject to RCRA storage and disposal requirements. Dispose off in compliance with all relevant local, state, and federal laws and regulations regarding treatment.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep in cool, dry, ventilated storage area, in closed containers and out of direct sunlight. Keep liquid and vapors away from heat, sparks and flame, store in containers above ground and surrounded by dikes to contain spills or leaks. Sufficient heat or pressure may ignite or detonate even liquid product in the absence of sparks or open flame. Extinguish pilot lights, cigarettes and turn off other sources of ignition before use and until all vapors are gone. Vapors may accumulate and travel to ignition sources distant from the handling site; flash fire can result. Keep containers closed when not in use. Containers, even those that have been emptied, may contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. Do not pressurize containers to empty them. Use explosion-proof lighting and equipment, non-sparking tools, clothes and shoes. Ground all structures, transfer containers and equipment to conform to the national electrical code. Use procedures which prevent static electrical sparks. Static electricity may accumulate and create a fire hazard.

OTHER PRECAUTIONS: Prevent skin and eye contact, observe TLV limitations. Avoid breathing vapors. Workers should shower and change to fresh clothing after each shift. A sensitized individual should not be exposed to the product that caused the sensitization. Air circulation and exhaustion of product vapors must be maintained until the coatings have fully cured to insure that no potential fire, explosion or health hazard remains. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent chronic overexposure from inhalation. This product can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposure to lower concentrations. Exposure to vapors of heated products can be extremely dangerous. Employee education and training in safe handling of this material is required under OSHA hazard communication standard. Individuals with existing respiratory disease such as chronic bronchitis, emphysema, or asthma should not be exposed to products. These individuals should be identified through baseline and annual evaluation and removed from further exposure. Medical examination should include medical history, vital capacity, and forced expiratory volume at one second.

SECTION VIII - CONTROL MEASURES

VENTILATION: The use of mechanical dilution ventilation is recommended whenever this product is used in a confined space, is heated above ambient temperatures, or is agitated. Use explosion-proof ventilation equipment. Use local exhaust ventilation to keep airborne concentrations below the TLV. Follow guidelines in the ACGIH publication "Industrial Ventilation". Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination.

RESPIRATORY PROTECTION: If airborne concentrations exceed or are expected to exceed the TLV, use MSHA/NIOSH approved positive pressure supplied air respirator with a full face piece or an air supplied hood. For emergencies, use a positive pressure self-contained breathing apparatus. Air purifying (cartridge type) respirators are not approved for protection against isocyanates.

PROTECTIVE CLOTHING: Gloves determined to be impervious under the conditions of use should be worn always when working with this product. Depending on conditions of use, additional protection may be required such as apron, arm covers, or full body suit. Wash contaminated clothing before re-wearing. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

EYE PROTECTION: Chemical tight goggles and full-face shield.

OTHER PROTECTIVE EQUIPMENT AND MEASURES: Unhindered access to safety shower and eye wash stations. As a general hygienic practice, wash hands and face after use. Showers and cleaning of clothes are recommended. Follow all label instructions. Educate and train employees in safe use of product.

SECTION IX - REGULATORY INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: Not regulated.

IMO PROPER SHIPPING NAME: Not regulated.

STATE REGULATIONS: CALIFORNIA - As per requirements of the Safe Drinking Water & Toxic Enforcement Act of CA, USA 1985 (Proposition 65), the public is warned that materials used in this product may create an exposure to chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. This warning required by Section 25249.6 of the California Health and Safety Code.

*N-METHYL-2-PRROLIDINONE CAS#872-50-4

TOXIC SUBSTANCE CONTROL ACT: All chemicals comprising this product are listed on the TSCA inventory.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Nukote ST, Side-A ISO

CHEMICAL FAMILY: Aromatic Isocyanates
SYNONYMS: Modified MDI

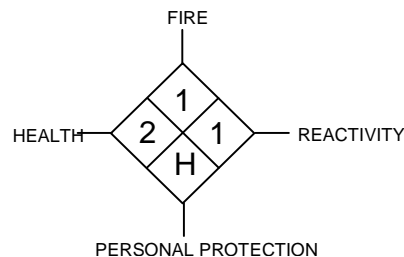
SECTION I – COMPANY IDENTIFICATION

COMPANY NAME: Nukote Coating Systems International LLC

ADDRESS: 8550 W. Desert Inn Road, Suite 102-652, Las Vegas, NV 89117, USA

EMERGENCY CONTACT: (CHEMTREC): 800-424-9300
Outside USA and Canada, call CHEMTREC collect: 703-527-3887

DATE REVISED: August 27, 2010



HMIS HAZARD RATING	
LEAST ----- 0	SLIGHT ---- 1
MODERATE --- 2	HIGH ----- 3
EXTREME ---- 4	

SECTION II – HAZARDOUS INGREDIENTS/SARA III INFORMATION

HAZARDOUS COMPONENTS	OCCUPATIONAL EXPOSURE LIMITS				VAPOR PRESSURE		
	CAS NUMBER	OSHA PEL (CEILING)	ACGIH TLV	MFG TLV	mm Hg @ 25°C (77°F)	% BY WEIGHT	
*4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	.02 ppm	.005 ppm		<5.0	60 – 90%	
URETHANE PREPOLYMER		N/E	N/E			10 – 40%	

* Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372. Information concerning non-hazardous ingredients is considered a Trade Secret

SECTION III – PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT: >230°C (446°F)

SPECIFIC GRAVITY: (H₂O=1): 1.11 - 1.13

COATING V.O.C: N/E

VAPOR DENSITY: Heavier than air

EVAPORATION RATE: Slower than ether

SOLUBILITY IN WATER: Reacts with water

APPEARANCE AND ODOR: Thin clear liquid, negligible odor

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: >123°C (253°F)

METHOD USED: TCC

FLAMMABLE LIMITS IN AIR BY VOLUME: Lower: N/E

Upper: N/E

EXTINGUISHING MEDIA: Dry chemical, foam, and carbon dioxide. If water is used, use very large quantities of cold water. The reaction between water and hot isocyanate may be vigorous.

SPECIAL FIRE FIGHTING PROCEDURES: Wear NIOSH approved self-contained breathing apparatus in positive pressure mode with full-face piece. Boots, gloves (neoprene), goggles, and full protective clothing are also required. Excessive pressure or temperature may cause explosive rupture of containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Water contamination will produce carbon dioxide. Do not reseal contaminated containers as pressure buildup may rupture them.

SECTION V – REACTIVITY DATA

STABILITY: Stable under normal conditions.

CONDITIONS TO AVOID: Heat, high temperature, open flame, sparks, and moisture. Contact with incompatible materials in a closed system will cause liberation of carbon dioxide and buildup of pressure.

INCOMPATIBILITY (MATERIALS TO AVOID): This product will react with any material containing active hydrogen, such as water, alcohol, ammonia, amines, alkalis and acids, the reaction with water is very slow under 50°C, but is accelerated at higher temperature and in the presence of alkalis, tertiary amines, and metal compounds. Some reactions can be violent.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon dioxide, carbon monoxide, nitrogen oxides, ammonia, traces amounts of hydrogen cyanide and unidentified organic compounds may be formed during combustion.

HAZARDOUS POLYMERIZATION: May occur. High temperature, above 204°C (400°F) in the presence of moisture, alkalis, tertiary amines, and metal compounds will accelerate polymerization. Possible evolution of carbon dioxide gas may rupture closed containers.

SECTION VI – HEALTH HAZARD DATA

SKIN CONTACT: Isocyanates react with skin protein and moisture and can cause irritation. Prolonged contact can cause reddening, swelling, rash, scaling, blistering, and, in some cases, skin sensitization. Individuals who have developed a skin sensitization can develop these symptoms because of contact with very small amounts of liquid material or because of exposure to vapor. Animal tests have indicated that respiratory sensitization can result from skin contact with MDI. This data reinforces the need to prevent direct skin contact with the product.

EYE CONTACT: Liquid, aerosols or vapors are severely irritating and can cause pain, tearing, reddening and swelling. Prolonged vapor contact may cause conjunctivitis. Any level of contact should not be left untreated.

SKIN ABSORPTION: Systemically toxic concentrations of this product will probably not be absorbed through human skin.

INGESTION: Can result in irritating and corrosive action in the mouth, stomach tissue and digestive tract. Symptoms can include sore throat, abdominal pain, nausea, vomiting and diarrhea.

INHALATION: MDI vapors or mist at concentrations above the TLV can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). High vapor concentrations may cause central nervous system (CNS) depression as evidenced by giddiness, headache, dizziness, and nausea. Persons with a preexisting, nonspecific bronchial hyperactivity can respond to concentrations below the TLV with similar symptoms as well as asthma attack. Exposure well above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Because of previous repeated overexposures or a single large dose, certain individuals may develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Chronic overexposure to isocyanate has also been reported to cause lung damage (including decrease in lung function) which may be permanent. Sensitization can either be temporary or permanent.

HEALTH HAZARDS: ACUTE: Exposure may cause mucous membrane and respiratory tract irritation, tightness of chest, headache, shortness of breath, and a dry cough. At concentrations exceeding current occupational limits and for sensitized individuals at levels less than or greater than current occupational limits, asthma-like symptoms may occur. These symptoms may include coughing, wheezing, and shortness of breath. A hypersensitive pneumonitis may also occur if the person is sensitized. Fever, nonproductive cough, wheezing, chills, and shortness of breath characterize this syndrome. Central nervous system (CNS) depression may also result. The effects of acute exposure may be delayed in onset up to 12-24 hours. **CHRONIC:** Repeated exposure above current occupational limits may cause an allergic sensitization of the respiratory tract. This is characterized by an asthma-like response upon re-exposure to the chemical. The symptoms may include coughing, wheezing, shortness of breath and chest tightness, and may be fatal. Central nervous system (CNS) depression may also result; unconsciousness and death may occur in extreme cases.

CARCINOGENICITY: NTP: No IARC Monographs: No OSHA Regulated: No

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Cardiovascular disease, asthma or asthmatic bronchitis, emphysema, allergic disease, chronic respiratory disease, sinusitis, headache and dizziness.

EMERGENCY AND FIRST AID PROCEDURES: EYE CONTACT: Immediately flush eyes with plenty of water, preferably lukewarm. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Have eyes examined and treated by medical personnel. **INHALATION:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is labored, give oxygen. Consult medical personnel. **SKIN CONTACT:** Wash material off the skin thoroughly with plenty of soap and water. If redness, itching, or a burning sensation develops, get medical attention. Wash contaminated clothing and decontaminates footwear before reuse. **INGESTION:** Do not induce vomiting. Give 1 or 2 glasses of milk or water to drink and refer person to medical personnel. Do not give anything by mouth to an unconscious person.

SECTION VII – PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear skin, eye, and respiratory protection during cleanup. Soak up material with absorbent and shovel into a chemical waste container. Cover container, but do not seal, and remove from work area. Prepare a decontamination solution of 2.0% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Follow the precautions on the supplier's material safety data sheets. Trained personnel familiar with the hazards of the chemicals used should perform all operations. Treat the spill area with the decontamination solution, using about 10 parts of solution for each part of the spill, and allow it to react for at least 15 minutes. Carbon

dioxide will be evolved, leaving insoluble polyureas. Residues from spill cleanup, even when treated as described may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, call CHEMTREC (Chemical Transportation Emergency Center) at 800-424-9300.

WASTE DISPOSAL METHOD: Slowly stir the isocyanate waste into the decontamination solution described above using 10 parts of the solution for each part of the isocyanate. Let stand for 48 hours, allowing the evolved carbon dioxide to vent away, residues may still be subject to RCRA storage and disposal requirements. Dispose off in compliance with all relevant local, state, and federal laws and regulations regarding treatment.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep in cool, dry, ventilated storage area, in closed containers and out of direct sunlight. Store in containers above ground and surrounded by dikes to contain spills or leaks. Keep containers closed when not in use. Containers, even those that have been emptied, may contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

OTHER PRECAUTIONS: Prevent skin and eye contact, observe TLV limitations. Avoid breathing vapors. Workers should shower and change to fresh clothing after each shift. A sensitized individual should not be exposed to the product that caused the sensitization. Air circulation and exhaustion of isocyanate vapors must be maintained until the coatings have fully cured to insure that no potential fire, explosion or health hazard remains. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent chronic overexposure from inhalation. This product can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposure to lower concentrations. Exposure to vapors of heated isocyanates can be extremely dangerous. Employee education and training in safe handling of this material is required under OSHA hazard communication standard. Individuals with existing respiratory disease such as chronic bronchitis, emphysema, or asthma should not be exposed to isocyanates. These individuals should be identified through baseline and annual evaluation and removed from further exposure. Medical examination should include medical history, vital capacity, and forced expiratory volume at one second.

SECTION VIII – CONTROL MEASURES

VENTILATION: If needed, use local exhaust ventilation to keep airborne concentrations below the TLV. Follow guidelines in the ACGIH publication "Industrial Ventilation". Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination.

RESPIRATORY PROTECTION: If airborne concentrations exceed or are expected to exceed the TLV, use MSHA/NIOSH approved positive pressure supplied air respirator with a full face piece or an air supplied hood. For emergencies, use a positive pressure self-contained breathing apparatus. Air purifying (cartridge type) respirators are not approved for protection against isocyanates.

PROTECTIVE CLOTHING: Gloves determined to be impervious under the conditions of use should be worn always when working with this product. Depending on conditions of use, additional protection may be required such as apron, arm covers, or full body suit. Wash contaminated clothing before re-wearing. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

EYE PROTECTION: Chemical tight goggles and full-face shield.

OTHER PROTECTIVE EQUIPMENT AND MEASURES: Unhindered access to safety shower and eye wash stations. As a general hygienic practice, wash hands and face after use. Showers and cleaning of clothes are recommended. Follow all label instructions. Educate and train employees in safe use of product.

SECTION IX – TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

Oral: LD50/rat: > 10,000 mg/kg.

Inhalation: LC50/rat: 0.368 mg/l / 4 h, LC50/rat: > 2.240 mg/l / 1 h.

SECTION X – ECOLOGICAL INFORMATION

ENVIRONMENTAL TOXICITY:

Acute and prolonged toxicity to fish: Static. Zebra fish/LC50 (24 h): > 500 mg/l.

Chronic toxicity to aquatic invertebrates: Daphnia magna EC50 (24 h) > 500 mg/l. Practically nontoxic.

SECTION XI – REGULATORY INFORMATION

FEDERAL REGULATIONS: Registration Status: TSCA, US is released / listed. TSCA 12B is released / listed.

OSHA HAZARD CATEGORY: ACGIH TLV established, Highly toxic – inhalation, Chronic target organ effects reported, Skin and/or eye irritant, Acute target organ effects reported, Sensitizer, OSHA PEL established.

CERCLA RQ
5,000 LBS

CAS NUMBER
101-68-8

CHEMICAL NAME
Diphenylmethane-4,4'-diisocyanate (MDI)

SARA HAZARD CATEGORIES (EPCRA 311/312): Acute, Chronic.

SARA 313:
CAS NUMBER

CHEMICAL NAME
Diisocyanate

STATE REGULATIONS: CALIFORNIA PROPOSITION 65 – To the best of our knowledge, this product contains no levels of listed substances, which the state of California has found to cause cancer, birth defects or other reproductive effects.

CASE NUMBER
101-6808

CHEMICAL NAME
Diphenylmethane-4,4'-diisocyanate (MDI)

STATE RTK
MA, NJ, PA

SECTION XII – OTHER INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: Not regulated.

IMO PROPER SHIPPING NAME: Not regulated.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Nukote ST, Side-B RESIN

CHEMICAL FAMILY: Diamines

SYNONYMS: Amine mixture

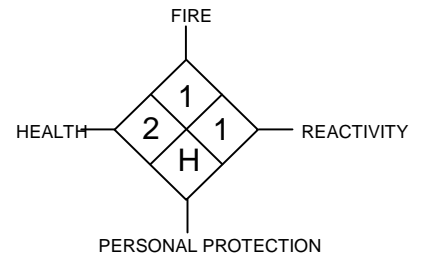
SECTION I – COMPANY IDENTIFICATION

COMPANY NAME: Nukote Coating Systems International LLC

ADDRESS: 8550 W. Desert Inn Road, Suite 102-652, Las Vegas, NV 89117, USA

EMERGENCY CONTACT: (CHEMTREC): 800-424-9300
Outside USA and Canada, call CHEMTREC collect: 703-527-3887

DATE REVISED: August 27, 2010



HMIS HAZARD RATING	
LEAST ----- 0	SLIGHT ---- 1
MODERATE --- 2	HIGH ----- 3
EXTREME ---- 4	

SECTION II – HAZARDOUS INGREDIENTS/SARA III INFORMATION

HAZARDOUS COMPONENTS	CAS NUMBER	OCCUPATIONAL EXPOSURE LIMITS			VAPOR PRESSURE		% BY WEIGHT
		OSHA PEL	ACGIH TLV	MFG TLV	mm Hg @ TEMP		
AROMATIC AMINE	68479-98-1	N/E	N/E		0.001	20°C (68°F)	10 – 40%
POLYOXYPROPLYENE DIAMINE	9046-10-0	N/E	N/E		1	100°C (212°F)	50 – 90%
AROMATIC DIAMINE	5285-60-9	N/E	N/E		< 1	20°C (68°F)	5 – 20%
CARBON BLACK	1333-86-4	N/E	N/E				1 – 5%

* No toxic chemical(s) subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372.
Information concerning non-hazardous ingredients is considered a Trade Secret

SECTION III – PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT: 308°C (586°F)

SPECIFIC GRAVITY: (H₂O=1): 1.03

COATING V.O.C.: N/E

VAPOR DENSITY: Heavier than air

EVAPORATION RATE: Slower than ether

SOLUBILITY IN WATER: Insoluble

APPEARANCE AND ODOR: Amber liquid, mild Ammonia-like odor

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: >100°C (212°F)

METHOD USED: TCC

FLAMMABLE LIMITS IN AIR BY VOLUME: Lower: N/E

Upper: N/E

EXTINGUISHING MEDIA: Dry chemical, foam, carbon dioxide, water spray (fog).

SPECIAL FIRE FIGHTING PROCEDURES: Wear NIOSH approved self-contained breathing apparatus in positive pressure mode with full-face piece. Boots, gloves (neoprene), goggles, and full protective clothing are also required. Excessive pressure or temperature may cause explosive rupture of containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

SECTION V – REACTIVITY DATA

STABILITY: Stable under normal conditions.

CONDITIONS TO AVOID: Open flame, sparks, and moisture. Contact with incompatible materials in a closed system will cause liberation of toxic vapors buildup of pressure.

INCOMPATIBILITY (MATERIALS TO AVOID): Strong acids and isocyanates.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Toxic levels of ammonia, combustion products of nitrogen, carbon monoxide, carbon dioxide, irritating aldehydes and ketones may be formed on burning in a limited air supply.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VI – HEALTH HAZARD DATA

SKIN CONTACT: Causes severe irritation with pain, severe excess redness and swelling with chemical burns, blister formation, and possible tissue destruction. Other than the potential skin irritation effects noted above, acute (short term) adverse effects are not expected from brief skin contact.

EYE CONTACT: Causes irritation experienced as pain, with excess blinking and tear production, and as seen as extreme redness and swelling of the eye and chemical burns of the eye. Severe eye damage may cause blindness.

SKIN ABSORPTION: Product may be absorbed through skin and cause nausea, headache, and general discomfort.

INHALATION: Vapors irritate eyes, nose and respiratory passages. Severe overexposure may induce respiratory sensitization with asthma like symptoms. Symptoms include chronic cough, tightness of chest with difficulty in breathing.

INGESTION: Causes burning of mouth, throat, and stomach with abdominal and chest pain, nausea, vomiting, diarrhea, thirst, weakness, and collapse. Aspiration may occur during swallowing or vomiting, resulting in lung damage.

HEALTH HAZARDS: ACUTE: Exposure may cause skin and eye irritation, respiratory tract irritation. Chemical burns may result due to overexposure. Affects of exposure may be delayed. May produce temporary and reversible hazy or blurred vision. Symptoms disappear when exposure is terminated.

CHRONIC: Repeated skin contact may cause a persistent irritation or dermatitis. Repeated inhalation may cause lung damage.

CARCINOGENICITY (FOR CLEAR MATERIAL): NTP: No IARC Monographs: No OSHA Regulated: No

CARCINOGENICITY (FOR PIGMENTED MATERIAL): NTP: No IARC Monographs: Yes OSHA Regulated: No
IARC classifies carbon black as a category 2B carcinogen (known animal carcinogen, possible human carcinogen) based on inhalation studies. Because this product is a free-flowing liquid or paste, dust inhalation is not an expected route of exposure. Sanding cured product can result in exposure to carbon black dusting.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Skin contact may aggravate an existing dermatitis (skin condition). Overexposure to vapor, dust or mist may aggravate existing respiratory conditions, such as asthma, bronchitis, and inflammatory or fibrotic respiratory disease.

EMERGENCY AND FIRST AID PROCEDURES: EYE CONTACT: Immediately flush eyes with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Have eyes examined and treated by medical personnel.
INHALATION: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is labored, give oxygen. Consult medical personnel. **SKIN CONTACT:** Wash material off the skin with plenty of soap and water. If redness, itching, or a burning sensation develops, get medical attention. Wash contaminated clothing and decontaminates footwear before reuse.
INGESTION: Do not induce vomiting. Give 1 or 2 glasses of water to drink and refer person to medical personnel. Never give anything by mouth to an unconscious person.

SECTION VII – PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear skin, eye, and respiratory protection during cleanup. Soak up material with absorbent and shovel into a chemical waste container. Cover container, but do not seal, and remove from work area. Residues from spill cleanup may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, call CHEMTREC (Chemical Transportation Emergency Center) at 800-424-9300.

WASTE DISPOSAL METHOD: Residues may still be subject to RCRA storage and disposal requirements. Dispose off in compliance with all relevant local, state, and federal laws and regulations regarding treatment.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in tightly sealed containers to protect from atmospheric moisture. Store in a cool dry area. Do not expose this material to open flames, spark or other sources of ignition.

OTHER PRECAUTIONS: Prevent skin and eye contact, observe TLV limitations. Avoid breathing vapors. Workers should shower and change to fresh clothing after each shift. A sensitized individual should not be exposed to the product that caused the sensitization. Individuals with existing respiratory disease such as chronic bronchitis, emphysema, or asthma should not be exposed. These individuals should be identified through baseline and annual evaluation and removed from further exposure. Medical examination should include medical history, vital capacity, and forced expiratory volume at one second.

SECTION VIII – CONTROL MEASURES

VENTILATION: If needed, use local exhaust ventilation to keep airborne concentrations below the TLV. Follow guidelines in the ACGIH publication "Industrial Ventilation". Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination.

RESPIRATORY PROTECTION: If airborne concentrations exceed or are expected to exceed the TLV, use MSHA/NIOSH approved positive pressure supplied air respirator with a full face piece or an air supplied hood. For emergencies, use a positive pressure self-contained breathing apparatus.

PROTECTIVE CLOTHING: Gloves determined to be impervious under the conditions of use should be worn always when working with this product. Depending on conditions of use, additional protection may be required such as apron, arm covers, or full body suit. Wash contaminated clothing before re-wearing. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

EYE PROTECTION: Chemical type goggles with full-face shield must be worn. Do not wear contact lenses.

OTHER PROTECTIVE EQUIPMENT AND MEASURES: Unhindered access to safety shower and eye wash stations. As a general hygienic practice, wash hands and face after use. Showers and cleaning of clothes are recommended.

SECTION IX – TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

Oral: LD50/rat: 480 mg/kg

Dermal: LD50/rat : 2090 mg/kg

Skin Irritation: Rat: Corrosive

Eye Irritation: As the product corrodes the skin, it can be expected to have a similar effect on the eyes also.

Other Information: No experimental evidence available for genotoxicity in vitro (Ames test negative).

SECTION X – ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE AND TRANSPORT:

Biodegradation:

Test method: OECD 301 A (old version)

Method of analysis: DOC reduction

Degree of elimination: 0 – 10%

Evaluation: Poorly eliminated from water. Poorly biodegradable.

ENVIRONMENTAL TOXICITY:

Acute and prolonged toxicity to fish: Golden orfe/LC50 (96 h): > 220 - < 460 mg/l

The product has not been tested. The statement has been derived from products of a similar structure and composition.

OTHER ECOTOXICOLOGICAL ADVISE:

Due to the pH-value of the product, neutralization is generally required before discharging sewage into treatment plants. The irritation of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations. Do not release untreated into natural waters.

SECTION XI – REGULATORY INFORMATION

FEDERAL REGULATIONS: Registration Status: TSCA, US is released / listed.

OSHA HAZARD CATEGORY: Toxic – dermal, Acute target organ effects reported, Corrosive to skin.

SARA HAZARD CATEGORIES (EPCRA 311/312): Acute.

STATE REGULATIONS: CALIFORNIA PROPOSITION 65 – To the best of our knowledge, this product contains no levels of listed substances, which the state of California has found to cause cancer, birth defects or other reproductive effects.

SECTION XII – OTHER INFORMATION

DOT PROPER SHIPPING NAME: Not regulated.

IATA PROPER SHIPPING NAME: Not regulated.

IMO PROPER SHIPPING NAME: Not regulated.

USER'S RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions, in addition to those described herein, are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER: The information contained herein is, to the best of our knowledge and belief, accurate and current as of the date of this MSDS. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose or any other nature are made hereunder with respect to the information contained herein or the chemical to which the information refers. It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations.

COMPANY DETAILS	
Name: Nukote Coating Systems International LLC Address: 8550 W. Desert Inn Road, Suite 102-652 , Las Vegas, NV 89117, USA Tel: +1-562-802-8834	Emergency telephone no.: 800-424-9300 Outside USA& Canada : 703-527-3887 Fax: +1-562-921-7364
1) Product and Company Identification: (Page 1 may be used as an emergency safety data sheet)	
Trade name : <i>Nukote Foam Component A</i>	Chemical abstract no. : 9016-87-9
Chemical family : Aromatic - Isocyanate	Hazchem code: Not Applicable
Chemical name: Diphenylmethane Diisocyanate	UN/NA no.: NA3082
Synonyms: MDI	
2) Composition	
Hazardous components: Disphenylmethane- diisocyanate, isomers and homologues (100% Weight)	
CAS Numbers: 9016-87-9, 101-68-8 , 5873-54-1	
R Phrases: Xn R20; Xi R36/37/38; R42	
3) Hazards Identification	
<p>Main hazard: Harmful by inhalation. Irritating to eyes, respiratory system and skin. May cause sensitization by inhalation. For their own protection, persons who suffer from hypersensitivity of the respiratory tract (e.g. asthmatics and chronic bronchitis sufferers) should avoid handling this product.</p> <p>Chemical hazard: Toxic gases/fumes may be given off during burning or thermal decomposition. Closed container may forcibly rupture under extreme heat or when contents have been contaminated with water.</p> <p>Potential Health Effects: <i>Primary routes of effects:</i> Skin Contact, Inhalation, Eye contact <i>Medical conditions Aggravated by exposure:</i> Asthma, Respiratory disorders, Skin Allergies, Eczema</p> <p>Health effects - eyes: <i>Acute:</i> Causes irritation with symptoms of reddening, tearing, stinging and swelling. May cause temporary corneal injury. Vapor or aerosol may cause irritation with symptoms of burning and tearing. <i>Chronic:</i> prolonged vapor contact may cause conjunctivitis.</p> <p>Health effects - skin: <i>Acute:</i> Causes irritation with symptoms of reddening, itching and swelling. Persons previously sensitized can experience allergic skin reaction with symptoms of reddening, itching, swelling and rash. Cured material is difficult to remove. Contact with MDI can cause discoloration. <i>Chronic:</i> Prolonged contact can cause reddening, swelling, rash and in some cases skin sensitization. Animal tests and other research indicate that skin contact with MDI can play a role in causing isocyanate sensitization and respiratory reaction.</p>	

Health effects - ingestion:

Acute: May cause irritation; symptoms may include abdominal pain, nausea, vomiting and diarrhea.

Health effects - inhalation:

Acute: Diisocyanate vapors or mist at concentrations above the TLV or PEL can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing chest discomfort, shortness of breath and reduced lung function (Breathing obstruction). Persons with a pre-existing, non specific bronchial hyper reactivity can respond to concentrations below the TLV or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchitis, bronchial spam and pulmonary edema (fluid in lungs). Chemical or hyper sensitivity pneumonitis, with flu-like symptoms (eg. Fever, chills) has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic : As a result of previous repeated over exposure or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. The symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthmatic attack, could be immediate or delayed up to several hours after exposure. Extreme asthmatic reactions can be life threatening. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Sensitization can be permanent. Chronic over exposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity: No Carcinogenic substances as defined by IARC, NTP and/or OSHA.

4) First-aid Measures

General: Take off immediately all contaminated clothing.

Product in eye: Contamination of the eyes must be treated by thorough irrigation with water, with the eyelids help open. A doctor (or eye specialist) should be consulted immediately

Product on skin: After contact with skin, wash immediately with plenty of water and soap. Call a doctor if necessary.

Product ingested: DO NOT induce the patient to vomit, medical advice is required.

Product inhaled: If aerosol or vapour is inhaled in high concentrations: Take the person into the fresh air and keep him warm, let him rest: if there is difficulty in breathing, medical advice is require

5) Fire-fighting Measures

Extinguishing media: CO₂, Foam, dry powder; in case of larger fires, water spray should be used.

Special hazards: In case of fire, formation of carbon monoxide, nitrogen oxide, isocyanate vapour, and traces of hydrogen cyanide is possible; Firemen have to wear self-contained breathing apparatus and NFPA compliant helmet, hood, boots and gloves.

Unusual Fire/ Explosion Hazards: Closed containers may forcibly rupture under extreme heat or when contents are contaminated with water (Co₂ formed). Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Large fires can be extinguished with large volumes of water applied from a safe distance, since reaction between water and hot diisocyanate can be vigorous.

6) Accidental Release Measures

Personal precautions: Evacuate non-emergency personnel. Isolate the area and prevent access. Remove ignition sources. Notify management. Put on protective equipment

Environmental precautions: Control source of the leak. Ventilate. Contain the spill to prevent spread into drains, sewers, water supplies or soil.

Small spills: Cover with damp, fluid-binding material (for example sand, saw dust, chemical binder based on Calcium Silicate Hydrate). Transfer to waste container after approx. 1 hour and do not seal (CO₂ formation!). Keep damp and in the open air in a safe place for 7 to 14 days. Waste should be disposed of as described in chapter 13, "Advice on Disposal".

Large spills: Released material may be pumped into to closed, but not sealed, metal container for disposal. Process can generate heat.

7) Handling and Storage

Handling precautions: Observe the usual precautionary measures for chemicals. Avoid contact with skin. In all areas where isocyanate aerosol and /or vapour concentrations are produced in such a way that the OEL is not exceeded. The air should be drawn away from the personnel handling the product and the efficiency of the exhaust equipment should be periodically checked. Wear respiratory protection if material is heated, sprayed, used in a confined space, or if the exposure limit is exceeded. Wash thoroughly after handling. Do not breathe smoke and gases created by overheating or burning this material.

Storage precautions: Keep Container tightly closed and dry. Keep separated from foodstuffs. Prevent cooling below 10°C and heating above 30°C. Further specific information see our: "Technical Information". Water pollution class (WGK):1- slightly hazardous to water. WGK = Classification in accordance with the German water Resources Act. VCI Storage Class : 10

8) Exposure Control/Personal Protection

Occupational exposure limits: Threshold Limit Value -- Time Weighted Average (TWA): 0.0049 PPM

Engineering control measures: Must use sufficient amount of ventilations using De-humidifier/Exhaust fans while spraying in confined spaces.

Personal protection - respiratory: Required at inadequately ventilated workplaces. If product is sprayed, wear air-fed mask or (for short periods only) a combination of charcoal filter and particulate filter mask (German type A2-P2).

Personal protection - hand: Protective gloves made of PVC

Personal protection - eye: Goggles / face protection

Personal protection - skin: Keep working clothes separate. Wash hands before breaks and at end of work.

Other protection: Work place -related threshold are listed in chapter 15: Regulations.

9) Physical and Chemical Properties

Appearance: Liquid form, brown color.

Odour: earthy, musty

pH: not applicable

Boiling point: >300°C at 1013 mbar

Melting point: Not applicable

Flash point: above 250°C (DIN EN 22719)

Flammability: Not flammable

Auto flammability (ignition temperature) : above 500°C (DIN 51794)

Explosive properties: Limits not determined

Oxidizing properties: Not Applicable

Vapour pressure: 1mbar at 20 °C / 12 mbar at 50°C

Density: 1.24 g/cm³ at 20°C (DIN 51757)

Pour Point : -24°C (DIN ISO 3016)

MDI : <0.00001 mbar at 20°C ; 0.00016 mbar at 50°C

Viscosity: approx. 300 mPa. s at 20°C (DIN 53019)

Solubility - water: insoluble, reacts

Solubility - solvent: insoluble, reacts

10) Stability and Reactivity

Conditions to avoid: Freezing temperatures and High temperatures (Above 175°C)

Incompatible materials: Water, Amines, Strong bases, Alcohols, copper Alloys.

Hazardous decomposition products: No hazardous decomposition products when stored and handled correctly.

Thermal decomposition: Polymerizes at about 260°C with evolution of CO₂.

Hazardous reactions: Contact with moisture, other materials that react with isocyanates, or temperatures above 260°C, may cause polymerization.

Exothermic reaction with amines and alcohols: Reacts with forming CO₂, in closed containers risk of bursting owing to increase of pressure.

11) Toxicological Information

Diphenylmethane-diisocyanate, isomers and homologues:

LD₅₀ Oral, rat (female): > 15000 mg/kg

LC₅₀ Inhalation, rat: 490 mg as aerosol/m³, 4.0 h of exposure.

Concentration of the saturated vapour of Diphenylmethane -4.4'-di-isocyanate (MDI) at 25°C ³C:0.09 mg/m.

In long-term inhalation study, rats were exposed over a period of 2 years to mechanically generate repairable aerosols (aerodynamic diameter 95% less than 5µm) of polymeric MDI (PMDI) in concentrations of 0.2, 1.0 and 6.0 mg Pmdi/m³. The group of animals exposed to the highest concentration suffered an increased incidence of lung tumours, persistent inflammatory changes to the nose, respiratory tract and lungs, and yellowish deposits in the respiratory tract and lungs. The animals in the 1.0 mg/m³ group exhibited slight irritation and inflammatory changes to the nose, respiratory tract and lungs, but did not develop lung tumors' and /or deposits. Animals in the 0.2 mg/m³ group suffered no irritation; this concentration was therefore deemed to constitute the "no-effect level".

Effect on the eyes: Causes slight temporary reddening and swelling of the conjunctiva and slight reversible clouding of the cornea. In high concentrations vapour of product has irritating effects on eyes and mucous membranes.

Effect of the skin: Irritant. In case of longer contact with skin. Tanning and irritating effects are possible.

Effect on Respiratory tract: In high concentrations vapour of product has irritating effects on eyes and mucous membranes.

Experience in humans: Irritation of the mucous membranes in the nose, throat and lungs, dryness of the throat, pressure on the chest, sometimes accompanied by breathing difficulties and headaches. Delayed appearance of the symptoms and allergic reaction in susceptible persons possible.

Sensitization: May cause sensitization by inhalation. The following information has been obtained on animal studies: Dermal sensitization: not evaluable since experimental results are contradictory.

Carcinogenicity: Rat, Male/Female, inhalation , 2 years, 17 hrs/day , 5 days/week; Negative

Mutagenicity: Genetic Toxicity in Vitro:

Ames : (salmonella typhimurium, Metabolic Activation: with /without). Positive and negative results were reported. The use of certain solvents which rapidly hydrolyze diisocyanates is suspected of producing the positive mutagenicity results.

Genetic Toxicity in Vivo: Micronucleus Assay: (mouse) negative.

12) Ecological Information

Do not allow to escape into waters, waste water of soil. Immiscible in water. Reacts with water at the interface producing CO₂ and forming a solid and Insoluble product with high melting point (polyurea). This reaction is accelerated by surfactants (e.g detergents) or by water soluble solvents. Previous experience shows that polyurea is inert and not-degradable.

Data on diphenylmethane- diisocyanate, isomers and homologues:

Aquatic toxicity - fish: LCO => 1000 mg/l (Test Species: Brachydanio rerio , Duration of test: 96 h)

Aquatic toxicity - daphnia : EC50 =>1000 mg/l , Duration of test:24 h

Aquatic toxicity - algae (Acute Bacteria toxicity) : EC =>50 100 mg/l (Tested on activated sludge micro organism, duration of test: 3 h)

Biodegradability: 0% after 28 days (respirometer test)

Bio-accumulation: Oncorhynchus mykiss (rainbow trout), Exposure time:112 d, <1BCF

Does not bio-accumulate.

13) Disposal Considerations

Disposal methods: Product Waste- Incinerate in a hazardous waste incinerator in accordance with the relevant regulation.

Disposal of packaging: Emptied Containers may be reconditioned or turned into scrap after the contents have been completely removed, any residue adhering to the walls neutralized and labels removed.

14) Transport Information

Product Shipping Name: 4.4' Diphenylmethane Diisocyanate (MDI)

UN/NA Number: NA3082

Packing group/ Hazard Class: III – Class 9

RSPA/ DOT regulated components: 4.4' Diphenylmethane Diisocyanate (MDI)

Reportable Quantities : 5,039 Kg

Sea Transport (IMDG) : Non –regulated

Air Transport (ICAO/IATA) : Non - regulated

Additional Transportation Information: When in individual containers of less than the product RQ, this material ships as non-regulated.

Trem card no.:

Other Information: Not dangerous cargo. Irritation to skin and mucous membranes. Slightly sensitive to frost. Avoid heat above +50°C. Keep dry. Keep away from food stuffs, acids and alkalis.

15) Regulatory Information.

EEC hazard classification: Labeling in accordance with Annex 1 of directive 67/548 EEC and its amendments and adaptations:

Symbol: Xn, hazard description: harmful

Contains: Diphenylmethane –diisocyanate, isomers and homologues

Risk phases: R20 : Harmful by inhalation

R36/37/38 : Irritating to eyes, respiratory system and skin

R42 : May cause sensitization by inhalation

R26: In Case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Safety phases: S28 : After contact with skin, wash immediately with plenty of water and soap

S38 : In case of insufficient ventilation, wear suitable respiratory equipment

S45 : In case of accident or if you feel unwell, seek medical advice immediately (Show the label where possible)

Protection of workers: TRGS 900. Limit value for Diphenylmethane -4.4 -diisocyanate (in the form of respirable aerosols) = 0.005 ml/ m³ (ppm) = 0.05 mg/m³ (-);

Peak concentration limit according to Category: = 1 =

Remarks (National legislation) :-

Council Directive 82 / 501 / EEC of 24 June 1982 on the major accident hazards of certain industrial activities as amended by the Council Directives 87 /216/ EEC of 19 March 1987 and 88/610/EEC of 24 November 1988. Diphenylmethane diisocyanate (MDI), Appendix III, Part I (Storage): 200000 Kg.

Technical instruction on air pollution control: Class I, Mass concentration of 20 mg/m³ and below at a mass flow rate of 0.1 kg/h and above.

Not subject to the German Regulation on Flammable Liquids (VbF).

The recommendations given in the leaflet of the " Berufsgenossenschaft der Chemischen Industrie" (Employers' Liability Insurance Association for the German Chemical Industry) entitled " Isocyanate" (M044) should be followed.

16) Other Information

For Internal US delivery :

Under 172.101, Appendix A, DOT (Department of Transportation) it is requested: MDI Reportable Quantity (RQ): 5000 lbs (2270 Kg).

In the Material Safety Data Sheet all chapters which have been changed since last edition are marked with an asterisk in front of the chapter number. This safety data sheet replaces all previous information. Revised and valid from : see date of issue

COMPANY DETAILS	
<p>Name: Nukote Coating Systems International LLC Address: 8550 W. Desert Inn Road, Suite 102-652 , Las Vegas, NV 89117, USA Tel: +1-562-802-8834</p>	<p>Emergency telephone no.: 800-424-9300 Outside USA& Canada : 703-527-3887 Fax:+1-562-921-7364</p>
1) Product and Company Identification: (Page 1 may be used as an emergency safety data sheet)	
<p>Trade name : <i>Nukote Foam – Component B</i></p> <p>Chemical family : Polyether polyols, Containing tertiary amines and Hydro Chloro Fluoro Carbons</p> <p>Chemical name: Polyol</p>	<p>Chemical abstract no. : 031568-06-6</p> <p>Hazchem code: Not applicable</p> <p>UN/NA no.: Not applicable</p>
2) Composition	
<p>Hazardous components: Polyether polyol , Tertiary Amines, Chlorinated Phosphate esters & Chloro Fluoro Carbon.</p> <p>CAS Number: 031568-06-6 , 102-71-6, 56-81-5</p> <p>R Phrases: Xi –R36/36/38, R42</p>	
3) Hazards Identification	
<p>Main hazard: No significant Hazards. Harmful if swallowed in large amounts</p> <p>Primary Routes of Entry: Skin contact, Eye contact</p> <p>Medical Conditions aggravated by exposure : Eye disorders, Respiratory disorders, Skin disorders</p> <p>Eye effects: Acute – May cause eye irritation.</p> <p>Health effects - skin: Acute – slight skin irritant.</p> <p>Skin absorption: No significant signs or symptoms indicative of any Health hazards are expected to occur as a result of skin absorption exposure.</p> <p>Health effects - ingestion: This material may be a slight health hazard if ingested in large quantities.</p> <p>Health effects - inhalation: The Presence of traces of tertiary amines and Hydro Chloro Fluoro Carbon may cause irritation. No hazards are expected to occur as result of inhalation exposure.</p> <p>Chronic Health effect (Long term) : No data exists regarding potential chronic health hazard</p> <p>Carcinogenicity: No Carcinogenic substances as defined by IARC, NTP and/or OSHA</p>	
4) First-aid Measures	
<p>Product in eye: In case of eye contact, immediately rinse with clean water for 20-30 minutes, Retract eyelids often. Obtain emergency medical attention if pain, blinking, tears or redness persists.</p>	

Product on skin: Remove contaminated clothing as needed, wash skin thoroughly with mild soap /water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first.

Product ingested: if ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

Product inhaled: Not expected to present a significant inhalation hazard under anticipated conditions of normal use.

5) Fire-fighting Measures

Extinguishing media: Dry Chemical, CO₂, Foam, Water spray for large fires.

Special fire fighting procedure: Fire fighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture.

6) Accidental Release Measures

Personal precautions: Soak up spills with inert solids such as clay or diatomaceous earth as soon as possible. Evacuate and keep unnecessary people out of spill area.

Environmental precautions: Sweep / Shovel into suitable disposal containers. Spill area may be slippery. Spread granular cover.

7) Handling and Storage

Handling, Storage and Decontamination Procedure: Hygroscopic, use dry nitrogen or low dew point air for tank padding. Keep drums tightly closed to prevent contamination, store at 10°C to 27°C.

Handling/storage precautions: This product is not classified as a dangerous good in the Dangerous goods code buy reference to a specific substance name or a generic substance name of group.

Packing and Labeling: No regulatory requirements.

8) Exposure Control/Personal Protection

Occupational exposure limits: No established standard

Engineering control measures: No special ventilation is usually required beyond that needed for normal comfort control.

Personal protection - respiratory: No special respiratory protection equipment is recommended under anticipated conditions of normal use with adequate ventilation.

Personal protection - hand: Use Permeation resistant gloves

Personal protection - eye: Eye protection such as chemical splash goggles and or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapour, contact lenses should not be worn.

Personal protection - skin: Depending on the conditions of use, protective apron, boots, head and face protection should be worn. These equipments should be cleaned thoroughly after each use.

Other protection: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices, wash hand before eating, drinking,

smoking or using toilet facilities, Promptly remove soiled clothing / wash thoroughly before re-use. Shower after work using plenty of soap and water.

9) Physical and Chemical Properties

Appearance: Viscous liquid

Odour: no Odour

pH: Not established

Boiling point: Not established

Melting point: Not established

Flash point (method) : Not established

Flammability Limit: Not determined (% Vol in Air)

Auto flammability (auto ignition temperature) : Not determined

Explosive properties: Not expected to be a fire/ explosion hazard under normal conditions of use.

Oxidizing properties: Not established

Vapour pressure: Not established

Density: Approx. 1 kg/m³ @ 25°C

Solubility - water: Not Soluble, Non reactive

Solubility - solvent: Not-soluble, reactive

10) Stability and Reactivity

Conditions to avoid: Strong acids and alkalies, isocyanates

Incompatible materials: Exothermic Reaction with isocyanates

Hazardous decomposition products: Incomplete combustion may release poisonous carbon monoxide and other toxic gases.

11) Toxicological Information

Toxicity Data for Polyether Polyol:

Acute Oral toxicity: LD50:>5,000 mg/kg (Rat, Male) (OECD Test Guideline 401)

Acute Dermal Toxicity: LD 50:> 2,000 mg/kg (OECD Test Guideline 401)

Skin Irritation: Rabbit, OECD Test Guideline 404, Slight irritant

Eye Irritation : Rabbit, moderate irritant

Toxicity Data for Tertiary Amine:

Acute Oral Toxicity: LD50: 571 mg/kg (Rat)
 Acute inhalation toxicity : LC50: 117 PPM, 6 h (Rat)
 Acute dermal toxicity: LD 50: 280µL/kg (rabbit) ; LD50: 238-750 mg/kg (rabbit)
 Skin Irritation : rabbit, Draize, Exposure Time: 24 h, severely irritating
 Eye Irritation : Rabbit, Draize, severely irritating
 Developmental Toxicity/Teratogenicity: Rabbit, female, dermal - No Teratogenic effects observed at doses tested.

12) Ecological Information

Ecological Data for Polyether Polyol:

Biodegradation : aerobic, <50 %, Exposure time ;28 d
 Acute and Prolonged Toxicity to Fish: LC0:>1,000 mg/l (Zebra Fish (Brachydanio Rerio), 48 h)
 Toxicity to Micro organisms:
 EC0: >1,000 mg/l (Activated sludge micro organisms, 3 h)

Ecological Data for Tertiary Amine: No data available for this component

13) Disposal Considerations

Disposal methods: Comply with Federal/ State /local environmental regulations for disposal
 Disposal of packaging: Recondition or dispose of empty container in accordance with governmental regulations.

14) Transport Information

Land Transport (DOT) : Non – Regulated
 Sea Transport (IMDG) : Non –regulated
 Air Transport (ICAO/IATA): Non- regulated
 IATA - class: IATA-DGR: Not restricted
 Other Information: Not Dangerous cargo. Avoid heat above +60°C. Keep separated from food stuffs.

15) Regulatory Information.

EEC hazard classification: Labeling in accordance with Annex 1 of directive 67/548 EEC and its amendments and adaptations:
 Risk phases: R36/37/38 : Irritating to eyes, respiratory system and skin
 R42 : May cause sensitization by inhalation
 R26: In Case of contact with eyes, rinse immediately with plenty of water and seek medical advice
 Safety phases: S28 : After contact with skin, wash immediately with plenty of water and soap
 S38 : In case of insufficient ventilation, wear suitable respiratory equipment
 S45 : In case of accident of if you feel unwell, seek medical advice immediately (Show the label where possible)

National legislation: Not subject to the German Regulation on Flammable Liquids (VbF).

16) Other Information

The information in the MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding incorrectness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge.

For this and other reasons, we do not assume responsibility and express ability for loss, damage or expense arising out of or in any way connected with the handling storage, use or disposal of the product.



10. FIELD QA/QC/ITP FORMS



DAILY INSPECTION REPORT
MULTI-LAYER SYSTEM

INSTALLER: _____

Job No: _____ Foreman: _____ Date: _____

Project: _____ Weather: _____

MH ID: _____ Dia. (in): _____ Depth (ft): _____

SPECIFIED COATING SYSTEM

Conditioner: _____

Primer: _____ DTF (mils): _____

Foam: _____ DTF (mils): _____

Topcoat: _____ DTF (mils): _____

SURFACE PREPARATION

(CIRCLE)

Substrate: (Brick / Concrete / Steel / Other) Other: _____

Prep (CIRCLE)

Method: (None / Wash / Blast / Other) Other: _____

LINER INSTALLATION

Conditioner: _____ Gallons

Pump Model	HOSE TEMP (°F)	A SIDE		B SIDE	
		Heater (°F)	Pressure (psi)	Heater (°F)	Pressure (psi)
Primer:					
Foam:					
Topcoat:					

FINAL INSPECTION (PASS / FAIL)

Foreman: _____ Inspector: _____

REMARKS
