Nu-Age Films®

ENGINEERED POLY SHEETING

A PRODUCT OF ISI BUILDING PRODUCTS®
ENGINEERED FILMS DIVISION

Nu-Age Films®

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ISI BUILDING PRODUCTS®
ENGINEERED FILMS DIVISION

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Nu-Age Films®

ENGINEERED POLY SHEETING

NU-AGE FILMS ARE THE FUTURE OF PLASTIC SHEETING FOR CONSTRUCTION, INDUSTRIAL AND AGRICULTURAL APPLICATIONS. UNLIKE OTHER MATERIALS, NU-AGE FILMS ARE DESIGNED AND MANUFACTURED UTILIZING PRIME GRADE VIRGIN RESIN. THERE IS ZERO RECYCLED CONTENT USED, THUS INCREASING THE FILMS' PERFORMANCE AND LONGEVITY.

THE MANUFACTURING TECHNOLOGY AND SPECIAL RESIN BLENDS PRODUCE A LIGHT, STRONG, DURABLE FILM THAT OUTPERFORMS ALL RESPECTIVE INDUSTRY STANDARDS. NU-AGE FILMS ARE STRONGER, AT LESS WEIGHT PER ROLL, WHEN COMPARED TO STANDARD PLASTIC SHEETING AND SIMPLY A COST-COMPETITIVE IMPROVEMENT TO ECONOMY GRADE PLASTIC SHEETING.

10+ **NU-AGE FILM 10+**
OUTPERFORMS 10-MIL POLY

6+ **NU-AGE FILM 6+**
OUTPERFORMS 6-MIL POLY

4+ **NU-AGE FILM 4+**
OUTPERFORMS 4-MIL POLY

- HIGH PERFORMANCE PLASTIC FILMS
- UNRIVALED MATERIAL SOLUTION
- SUPERIOR VALUE
- AVAILABLE IN CUSTOM SIZES

ISI BUILDING PRODUCTS®
401 TRUCK HAVEN ROAD EAST PEORIA ILLINOIS 61611 — PHONE: 866.698.6562 — FAX: 309.698.0065

NU-AGE FILMS® WHITE PAPER

ISI Building Products® creates cutting edge building products, insulation and accessories for a variety of industries. The majority of our products are created to solve problematic areas surrounding the building envelope, starting from the ground up.

By creating diverse vapor barriers and retarders, we are able to counter the hurdles that arise when dealing with under-slab moisture and vapor. Under slab vapor barriers/retarders are created to block, or at a minimum retard, water vapor from entering the building envelope through the concrete slab. Flooring failures, mold, mildew, degradation and damage to moisture sensitive furnishings within a building's interior may occur without the use of an appropriate vapor barrier/retarder.

Traditionally inexpensive polyethylene sheeting, also known as C & A film or visqueen, has been used in various thicknesses to address the water vapor issues occurring under a concrete slab. The downside to this approach is these materials often contain high percentages of reprocessed/recycled resin eventually decreasing the chemical makeup and mechanical performance of the sheeting. The recycling of resin is a positive way of reducing the cost put toward producing such materials; however, each time the resin is broken down the properties begin to diminish. Introducing re-used/recycled plastic resin to building materials has its place, just not underneath a concrete slab. Vapor barriers/retarders buried beneath a concrete slab should be manufactured from a first melt basis. In other words, under-slab vapor barriers/retarders should be manufactured from 100% virgin resin to adequately maintain performance properties for the long term.

In addition to the many benefits of using virgin resin, there are also improvements to the way films are manufactured. Traditional polyethylene sheeting is commonly manufactured in a single layer, single resin set up. More advanced performing films, such as Nu-Age Films®, are manufactured in a multi-layer or co-extrusion process. This technology uses separate extruders to create layers of desired polymer formulations meeting the films performance needs. These layers merge together in their liquid state and are blown into one multi-layer film. Co-extruded films are in high demand as they incorporate the best properties of different resins and link them all together into one film structure. This approach creates a fine-tuned balance of properties performing better than each individual part.

Understanding a film's performance and where to use it can often be more confusing than it needs to be. For instance, polyethylene sheeting is a multi-use product for construction, industrial and agricultural applications. Each application presents its own set of challenges and performance needs, therefore an all encompassing standard, ASTM D 4397 (Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications), has been established to assign performance guidelines for polyethylene sheeting, 10.0-mils (250 µm) or less in thickness. The key properties for polyethylene sheeting are water vapor transmission, puncture resistance, tensile strength and elongation. The following charts are taken directly from ASTM D 4397 and assign performance values based on the properties described above:

TABLE 1 Dart Drop Impact Resistance[A]

Nominal Thickness, µm (mils)	Dart Drop Impact Resistance, min, g
25 (1.0)	40
38 (1.5)	65
50 (2.0)	85
75 (3.0)	125
100 (4.0)	165
125 (5.0)	205
150 (6.0)	260
175 (7.0)	315
200 (8.0)	370
225 (9.0)	420
250 (10.0)	475

[A] Values for nominal thickness other than those listed shall be determined by arithmetical interpolation.

Table 1: The puncture or impact resistance determines energy, in terms of weight, causing the material to fail. With impact resistance, the higher the value, the more resistive the material is to punctures.

TABLE 2 Mechanical Properties

	Lengthwise Direction	Crosswise Direction
Tensile strength, min, MPa (psi)	11.7 (1700)	8.3 (1200)
Elongation, min, %[A]	225	350

[A] For films of nominal thickness of <2 mils (<50 µm), minimum % to be 200 and 325, respectively (LD/CD).

Table 2: Tensile strength and elongation are used to determine a material's mechanical properties and how much stress can be applied before the material ruptures. As with impact resistance, the higher the tensile and elongation value, the more resistive the material is to ruptures or breaking.

Tables 3 and 4: The water vapor transmission rate (commonly calculated and recorded as perms) determines how much water vapor will pass through a material. With this property, the lower the value, the more resistive the material is to water vapor migration.

TABLE 3 Specification for Water Vapor Transmission Rate (WVTR)[A]

WVTR (g/24·h·m^2) max	Nominal Thickness		WVTR (g/24·h·100·in.^{2}) max
	µm	(mils)	
22.0	25	(1)	1.40
11.0	50	(2)	0.70
7.3	75	(3)	0.47
5.5	100	(4)	0.35
4.4	125	(5)	0.28
3.7	150	(6)	0.23
3.1	175	(7)	0.20
2.8	200	(8)	0.18
2.4	225	(9)	0.16
2.2	250	(10)	0.14

[A] Values for nominal thickness other than those listed shall be determined by arithmetical interpolation.

TABLE 4 Specification for Permeance[A]

Permeance[B] (metric perms), max	Nominal Thickness		Permeance[C] (perms), max
	µm	(mils)	
0.50	25	(1)	0.76
0.25	50	(2)	0.38
0.17	75	(3)	0.25
0.12	100	(4)	0.19
0.10	125	(5)	0.15
0.084	150	(6)	0.13
0.070	175	(7)	0.11
0.063	200	(8)	0.096
0.054	225	(9)	0.082
0.050	250	(10)	0.076

[A] Values for nominal thickness other than those listed shall be determined by arithmetical interpolation.
[B] Permeance in metric perms is found by dividing WVTR, g/24·h·m^2, by the pressure difference of water vapor, µm Hg, at the test temperature.
[C] Permeance in perms is found by dividing WVTR, grains/h·ft^2, by the pressure difference of water vapor, in. Hg at the test temperature. To convert WVTR from g/h·100 in. ^{2} to grains/h·ft^2, multiply by 0.926.

All of these physical properties are created naturally in the production of polyethylene sheeting to some degree. Again, the value of each property revolves around the ingredients and technology used in the manufacturing process.

Determining what film/sheeting should be used for a given application generally falls under the responsibility of the International Building Code® (IBC®) or the International Residential Code® (IRC®) as written by the

International Code Council® (ICC®). Building construction and design professionals, such as architects and engineers, will also establish appropriate guidelines for specific applications from the IBC®, IRC® and/or respective American Society for Testing and Materials (ASTM) standards. Under-slab vapor retarding applications are a very common place for plastic sheeting type products. The most recognized application specific standard is ASTM E 1745 (Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs). ASTM E 1745 is geared specifically towards under- slab vapor retarding applications, whereas ASTM D 4397 is more generalized as previously discussed. ASTM E 1745 is predominately a high performance product driven standard creating a good, better, best approach to protecting high dollar flooring systems applied with water based adhesives. ASTM E 1745 standardizes materials in a classification system of Class A, B or C (Class A being the highest rating, Class C the lowest). The classifications are also directly related to a materials puncture resistance, water vapor transmission and tensile strength. With ASTM E 1745, the performance values or requirements are set much higher and, in most cases, can only be achieved from co-extrusion films manufactured from virgin resin blends. Our Viper® under-slab vapor barriers and retarders offer a complete line of products conforming to and exceeding all ASTM E 1745 requirements.

When dealing with smaller footprints, such as residential slabs, the International Building Code® is generally followed. Section 1907, as displayed below, is an excerpt from the 2015 International Building Code® outlining the minimum slab provisions:

SECTION 1907
MINIMUM SLAB PROVISIONS

1907.1 General. The thickness of concrete floor slabs supported directly on the ground shall not be less than $3^1/_2$ inches (89 mm). A 6-mil (0.006 inch; 0.15 mm) polyethylene vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the base course or subgrade and the concrete floor slab, or other *approved* equivalent methods or materials shall be used to retard vapor transmission through the floor slab.

450 2015 INTERNATIONAL BUILDING CODE®

The highlighted text listed above allows for other approved equivalent methods or materials. For this example, Nu-Age Film® 6+ meets and exceeds the performance properties of 6-mil polyethylene sheeting, as ruled by ASTM D 4397, and would be considered an equivalent method or material used to retard vapor transmission through a floor slab. The majority of state building codes conform to the same codes as written by the International Building Code®. For example, the minimum slab provisions found in section 1907 of the 2014 Florida Building Code® are adapted and taken directly from the same section as referenced in the above International Building Code®.

To reinforce the fact that performance of a material does not just come from its thickness, Nu-Age Films® were independently tested by nationally accredited, third party laboratories. Nu-Age Films® 6+ and 10+ have also received building product listings (ESL-1009 and ESL-1033 respectively) from the International Code Council Evaluation Service (ICC-ES®). The listings provide evidence that the engineered vapor retarders meet consensus standards requirements in the I-Codes. Building officials, architects, contractors, specifiers and designers utilize ICC-ES® Building Product Listings to provide a basis for using or approving Nu-Age Films® 6+ and 10+ in construction projects under the International Building Code®. The ICC-ES® examined ISI Building Products

product information, test reports, calculations, quality control methods and other factors to ensure the product is compliant with the specific consensus standards. Charts below summarize results for Nu-Age Films® 6+ and 10+ when compared to the properties listed in ASTM D 4397 for 6-mil and 10-mil polyethylene sheeting:

ASTM D 4397 PERFORMANCE PROPERTIES (6-MIL)

Properties	ASTM Standard	Nu-Age Film 6+ (2.5-mil)	6-mil Polyethylene Sheeting
Dart Drop Impact Resistance	ASTM D 1709 Method A	299 grams	260 grams
Tensile Strength	ASTM D 882 Method A	4,860 PSI (Lengthwise) 4,650 PSI (Crosswise)	1,700 PSI (Lengthwise) 1,200 PSI (Crosswise)
Elongation	ASTM D 882 Method A	910% (Lengthwise) 850% (Crosswise)	225% (Lengthwise) 350% (Crosswise)
Water Vapor Permeance	ASTM E 96 Method E	0.028 perms	0.13 perms

ASTM D 4397 PERFORMANCE PROPERTIES (10-MIL)

Properties	ASTM Standard	Nu-Age Film 10+ (4.2-mil)	10-mil Polyethylene Sheeting
Dart Drop Impact Resistance	ASTM D 1709 Method A	598 grams	475 grams
Tensile Strength	ASTM D 882 Method A	5,030 PSI (Lengthwise) 4,870 PSI (Crosswise)	1,700 PSI (Lengthwise) 1,200 PSI (Crosswise)
Elongation	ASTM D 882 Method A	920% (Lengthwise) 1,000% (Crosswise)	225% (Lengthwise) 350% (Crosswise)
Water Vapor Permeance	ASTM E 96 Method E	0.047 perms	0.076 perms

There are endless options in film engineering through the use of prime grade virgin resin and co-extrusion manufacturing technology. This manufacturing approach has greatly influenced the success of Viper high performance under-slab vapor barriers and retarders. The same expectations have positioned Nu-Age Films® in high regard. By creating superior value without forfeiting quality, Nu-Age Films® are changing the face of polyethylene sheeting used in construction, industrial and agricultural applications.

Nu-Age Films®

FREQUENTLY ASKED QUESTIONS

Q: What is the difference between Nu-Age and standard poly?
A: Nu-Age Films are engineered films manufactured from state of the art tri-layer extruders. The manufacturing equipment has a high degree of versatility allowing for several types of plastic or polymers to be combined into one film structure. Furthermore, Nu-Age Films are manufactured from 100% virgin resin blends allowing for longevity and better performance. Simply put, Nu-Age Films are produced using advances in equipment technology along with quality ingredients.

Q: What are the differences between Nu-Age Film 4+, 6+ and 10+?
A: Nu-Age Films 4+ outperforms Standard 4-mil polyethylene sheeting, Nu-Age Films 6+ outperforms 6-mil poly and Nu-Age Films 10+ outperforms 10-mil poly. All are approximately 1/2 the weight in comparison.

Q: If it is lighter weight then how is it better?
A: It's not just about weight. Standard poly contains high percentages of reprocessed and reground resin and is blown through single layer extruders. The more polyethylene is reprocessed and recycled the greater the reduction in performance and stability. Furthermore, single layer extrusion machines limit the products ingredients and polymer formulation.

Q: What are the available roll sizes?
A: Nu-Age Films can be manufactured up to 20 feet in width. Common factory production roll sizes are:
- Nu-Age Film 10+ = 20 ft. x 100 ft.
- Nu-Age Film 6+ = 20 ft. x 100 ft.
- Nu-Age Film 4+ = 20 ft. x 200 ft.

Larger roll lengths are available upon request.

Q: What is ASTM D 4397?
A: ASTM D 4397 is the Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications. ASTM D 4397 outlines the required performance properties of polyethylene sheeting materials ranging from 1-mil up to 10-mil.

Q: What are the key performance properties as specified per ASTM D 4397?
A: Puncture resistance, tensile strength, elongation and water vapor transmission rate/permeance.

Q: Does Nu-Age meet current International Building Codes?
A: Yes, the minimum slab provisions (section 1907) per the 2015 International Building Code calls for a 6-mil polyethylene vapor retarder to be placed between the base course or subgrade and the concrete floor slab, or other approved equivalent methods or materials used to retard vapor transmission through the floor slab. Nu-Age Films 6+ meets and exceeds the performance properties of 6-mil polyethylene sheeting as outlined in ASTM D 4397 and would be considered an equivalent method.

Q: What does ICC ESL-1009 mean for Nu-Age Film 6+?
A: ICC ESL-1009 is a product certification listing that includes testing samples taken from the market, supplier's stock, or a combination of both, to verify compliance with applicable codes and standards. The ICC ESL-1009 reports that Nu-Age Films 6+ conforms to ASTM D 4397-10 Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications and carries properties listed in Table 1 of report (see below).

TABLE 1 – PROPERTIES OF NU-AGE FILMS 6+ AS APPLICABLE TO ASTM D 4397-10

Thickness (inches)	0.0024
Impact Resistance (g)	299
Tensile Strength at Break (length direction) Exceeds 1700 psi	Yes
Tensile Strength at Break (width direction) Exceeds 1200 psi	Yes
Elongation % at Break (length direction) Exceeds 225%	Yes
Elongation % at Break (width direction) Exceeds 350%	Yes
Reflectance	n/a
Luminous Trasmittance	n/a
Permeance (Perms)	0.028
Heat Sealability	n/a

For SI: 1 inch = 24.5 mm, psi = 0.0069 MPa

Q: What does ICC ESL-1033 mean for Nu-Age Film 10+?
A: ICC ESL-1033 is a product certification listing that includes testing samples taken from the market, supplier's stock, or a combination of both, to verify compliance with applicable codes and standards. The ICC ESL-1033 reports that Nu-Age Films 10+ conforms to ASTM D 4397-10 Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications and carries properties listed in Table 1 of report (see below).

TABLE 2 – PROPERTIES OF NU-AGE FILMS 10+ AS APPLICABLE TO ASTM D 4397-10

Thickness (inches)	0.0044
Impact Resistance (g)	598
Tensile Strength at Break (length direction) Exceeds 1700 psi	Yes
Tensile Strength at Break (width direction) Exceeds 1200 psi	Yes
Elongation % at Break (length direction) Exceeds 225%	Yes
Elongation % at Break (width direction) Exceeds 350%	Yes
Reflectance	n/a
Luminous Trasmittance	n/a
Permeance (Perms)	0.047
Heat Sealability	n/a

For SI: 1 inch = 24.5 mm, psi = 0.0069 MPa

Q: Does Nu-Age contain any recycled material?
A: Nu-Age Films are manufactured using 100% virgin resin. There is no recycled or reprocessed resin used.

Q: What applications can Nu-Age be used for?
A: Nu-Age Films are used in a wide variety of construction, industrial and agricultural applications. The use of Nu-Age Films 4+, 6+ or 10+ is determined by the degree of performance needed for the respective application.

Q: Why is in-house film analysis and testing of Nu-Age important?
A: For quality control purposes, samples of Nu-Age Films are pulled at random and put through a series of five tests, 8 to 10 different times to ensure the highest quality material.

Q: Why should I consider choosing Nu-Age over other polyethylene sheeting?
A: Nu-Age Films are lighter, stronger and a better overall quality when compared to other polyethylene sheeting products available today.

Nu-Age Films®

ENGINEERED POLY SHEETING

10+

ICC EVALUATION SERVICE
In Cooperation with Innovation RESEARCH LABS

Most Widely Accepted and Trusted

ICC-ES Listing Report

ESL-1033

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Reissued 08/2018
This listing is subject to renewal 08/2019.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 13 00—SHEET WATERPROOFING

REPORT HOLDER:

ISI BUILDING PRODUCTS

EVALUATION SUBJECT:

NU-AGE FILMS™ - FILM 10+

ICC-ES ICC-ES PMG ICC-ES LISTED

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ICC-ES Listing Report

ESL-1033

Reissued August 2018

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CSI: DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 13 00—Sheet Waterproofing

Product Certification System:

The ICC-ES product certification system includes evaluating reports of tests of standard manufactured product, prepared by accredited testing laboratories and provided by the listee, to verify compliance with applicable codes and standards. The system also involves factory inspections, and assessment and surveillance of the listee's quality system.

Product: Nu-Age FILMS™ - FILM 10+

Listee:
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401 TRUCK HAVEN ROAD
EAST PEORIA, ILLINOIS 61611
(309) 698-0062
info@isibp.com
www.isibp.com

Evaluation: Nu-Age Films™ – Film 10+ was evaluated to the following standard:

- ASTM D4397-10, Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications, ASTM International.

Findings: Nu-Age Films™ – Film 10+, has the properties noted in Table 1 when applied in accordance with the manufacturer's instructions and tested in accordance with ASTM D4397.

Identification: Packaging of Nu-Age Film carries a label indicating the manufacturer's name and address, the product name, the thickness of the sheeting and the ICC-ES Listing Report number (ESL-1033), and when applicable, the ICC-ES Listing Mark.

Installation: The product must be installed in accordance with the ISI Building Products, published installation instructions.

Conditions of listing:

1. This listing report addresses only conformance with the standard noted above.
2. The product as listed is non-color-tinted and translucent. The product has not been evaluated for reflectance, luminous transmittance or heat sealability.
3. Approval of the product's use is the sole responsibility of the local code official.
4. The listing report applies only to the material tested and as submitted for review by ICC-ES.

TABLE 1—PROPERTIES OF NU-AGE FILM 10+ AS APPLICABLE TO ASTM D4397-10

Thickness (inches)	0.0044
Impact Resistance (g)	598
Tensile Strength at Break (length direction) Exceeds 1700 psi	Yes
Tensile Strength at Break (width direction) Exceeds 1200 psi	Yes
Elongation % at Break (length direction) Exceeds 225%	Yes
Elongation % at Break (width direction) Exceeds 350%	Yes
Reflectance	n/a
Luminous Transmittance	n/a
Permeance (Perms)	0.047
Heat Sealability	n/a

For **SI:** 1 inch = 25.4 mm, 1 psi = 0.0069 MPa

TDS

VERSION 20.0

Nu-Age Films®

10+ ENGINEERED POLY SHEETING

VAPOR RETARDERS

DIVISION
033000, 072600

PRODUCT NAME

Nu-Age Films• 10+ Engineered Poly Sheeting

MANUFACTURER

ISI BUILDING PRODUCTS
401 Truck Haven Road
East Peoria, IL 61611
866.698.6562 / www.isibp.com

PRODUCT DESCRIPTION

BASIC USE
Nu-Age Films are uniquely enhanced high performance vapor retarders that exceed performance properties of conventional single layer polyethylene sheeting. Nu-Age Films 10+ surpasses 10-mil polyethylene sheeting requirements outlined in ASTM D 4397. Nu-Age Films are used as multi-purpose high performance vapor retarders for numerous construction, industrial and agricultural applications. Nu-Age Films 10+ delivers excellent impact resistance, tensile strength and elongation for demanding vapor retarder and protective covering applications.

COMPOSITION & MATERIALS
Nu-Age Films are tri-layer extruded films manufactured and engineered using a distinct virgin resin formulation. The tri-layer extrusion uses separate extruders to produce different layers of polymers. The layers join, in the liquid state, just before they are extruded. The tri-layer manufacturing is desirable as it takes the best properties of different resins and links them together. The film structure is then engineered to perform better than its individual parts. Nu-Age Films 10+ is a lighter weight roll with increased product performance all while maintaining long-term stability.

SIZE
Available in roll sizes ranging from 8 to 20 feet wide by 100 feet in length. Special roll lengths are available upon request.

WEIGHT
Approximately 21.3 lbs per 1,000 ft^2 at .00445 inches (113 µ) thick.

BENEFITS
- Unrivaled material solution
- Made from premium grade virgin resin
- Enhanced performance
- State-of-the-art one-of-a-kind technology
- Lighter weight for ease of installation
- Outperforms 10-mil poly per ASTM D 4397
- Multi-use for construction, industrial and agricultural applications
- Superior value without forfeiting quality

TECHNICAL DATA

APPLICABLE STANDARDS

ASTM D 4397 Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

ASTM D 2103 Standard Specification for Polyethylene Film and Sheeting

ASTM D 1709 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting

ASTM F 1249 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials

ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

NOTE: All Nu-Age Films are tested by accredited, third-party testing agencies following stringent industry guidelines and testing standards.

ENVIRONMENTAL CONSIDERATIONS
Nu-Age Films can aid in controlling soil gas such as radon.

PHYSICAL PROPERTIES
Nu-Age Films 10+ exceeds 10-mil polyethylene sheeting performance properties outlined in ASTM D 4397.

INSTALLATION

UNDER-SLAB INSTALLATION

SUB-GRADE PREPARATION
Level and tamp or roll granular base as specified by the architectural or structural drawings.

VAPOR BARRIER PLACEMENT
Unroll Nu-Age Films with the longest dimension parallel with the direction of the pour. Unfold Nu-Age Films to full width.

Lap Nu-Age Films over the footings and seal to the vertical foundation walls with one of the following vapor barrier accessories: White Viper® Vapor Tape, Viper® Double Bond Tape, Viper® VaporPatch or VaporCheck® Mastic.

PROTECTION
When installing reinforcing steel and utilities, in addition to the placement of concrete, take precaution to protect Nu-Age Films. Carelessness during installation can damage the most puncture-resistant vapor barriers. Provide for additional protection in high-traffic areas.

Place standard reinforcing bar supports on Nu-Age Films. The strength characteristics of Nu-Age Films will help guard against possible punctures caused by reinforcing bar supports.

Avoid driving stakes through Nu-Age Films. If this cannot be avoided, each individual hole must be repaired.

If a cushion or blotter layer is required in the design between the vapor barrier and the slab, additional care should be taken, especially if sharp crushed rock is used. Washed rock will provide less chance of damage during placement.

These are very general installation instructions. Instructions on architectural or structural drawings should be reviewed and followed. Detailed installation instructions can be obtained by calling our corporate office at 866.698.6562 or online at www.isibp.com.

NOTE: These installation instructions are based on ASTM E 1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. These instructions are intended to be used as a guide and do not take into account specific job site conditions.

For further details, check with local building codes, ACI 302, ACI 360 and/or architectural/engineering specifications.

WARRANTY

Warranty information can be obtained by calling the manufacturer at 866.698.6562 or visiting www.isibp.com.

MAINTENANCE

Requires no maintenance once installed.

TECHNICAL SERVICES

Technical information and detailed test results can be obtained by calling the manufacturer at 866.698.6562.

FILING SYSTEMS

Additional information can be obtained by calling the manufacturer at 866.698.6562 or visiting www.isibp.com.

PROPERTIES **TEST PROCEDURE** (INDEPENDENT TEST FACILITY)	TEST METHOD **APPLICABLE STANDARDS**	RESULTS **IP UNITS**
THICKNESS	N/A	.00445 in | 113 µ
PERFORMANCE CLASSIFICATION	ASTM D 4397	EXCEEDS 10-mil
PERFORMANCE CLASSIFICATION	ASTM D 1745	EXCEEDS CLASS C
FILM TYPE	ASTM D 2103	TYPE 15234
PUNCTURE RESISTANCE	ASTM 1709 METHOD A	598 grams
PUNCTURE RESISTANCE	ASTM 1709 METHOD B	490 grams
TENSILE STRENGTH	ASTM D 882	5,030 PSI LD | 34.7 MPa 4,870 PSI CD | 33.6 MPa
ELONGATION	ASTM D 882	920% LD, 1,000% CD
WATER VAPOR PERMEANCE	ASTM E 96 METHOD E	0.047 perms* | 0.031 perms**
CHEMICAL RESISTANCE	N/A	UNAFFECTED
LIFE EXPECTANCY	N/A	INDEFINITE

**grains/(ft²*hr*inHg) **g/(m²*24hr*mmHg)*

ICC ES LISTED ESL-1033

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DARE TO COMPARE

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10+

ASTM D 4397 PERFORMANCE PROPERTIES

PROPERTIES (ASTM)	NU-AGE FILM 10+	10-MIL PE SHEETING
Dart Drop (D 1709) Impact Resistance (Grams)	598	475
Tensil Strength (D 882) Lengthwise (PSI) / Crosswise (PSI)	5,030 / 4,870	1,700 / 1,200
Elongation (D 882) Lengthwise (%) / Crosswise (%)	920 / 1,000	225 / 350
Water Vapor Permeance (Perms)	0.047	0.076

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401 TRUCK HAVEN ROAD EAST PEORIA ILLINOIS 61611 — PHONE: 866.698.6562 — FAX: 309.698.0065

NU-AGE FILMS® 10+

This letter certifies that polyethylene sheeting manufactured by ISI Building Products meets ASTM D 4397-10 (Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications) and *ASTM D 2103-10 (Standard Specification for Polyethylene Film and Sheeting) and is manufactured in the U.S.A.

Thickness ASTM D 6988 Mils	Dart Drop Impact ASTM D 1709 Grams	Tensile Strength ASTM D 882 PSI (LD/CD)	Elongation ASTM D 882 % (LD/CD)	WVTR ASTM E 96 (g/24·h·100·in.²)	Permeance ASTM E 96 (perms)
1	40	1700/1200	200/325	1.40	0.76
2	85	1700/1200	225/350	0.70	0.38
3	125	1700/1200	225/350	0.47	0.25
4	165	1700/1200	225/350	0.35	0.19
5	205	1700/1200	225/350	0.28	0.15
6	260	1700/1200	225/350	0.23	0.13
7	315	1700/1200	225/350	0.20	0.11
8	370	1700/1200	225/350	0.18	0.096
9	420	1700/1200	225/350	0.16	0.082
10	475	1700/1200	225/350	0.14	0.076

ASTM D 2103 Classification: Film Type - 15234

Nu-Age Films®

ENGINEERED POLY SHEETING

6+

ICC EVALUATION SERVICE
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ICC-ES Listing Report

ESL-1009

ICC-ES | (800) 423-6587 | (562) 699-0543 | www.icc-es.org

Reissued 12/2018
This listing is subject to renewal 12/2019.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 13 00—SHEET WATERPROOFING

REPORT HOLDER:

ISI BUILDING PRODUCTS

EVALUATION SUBJECT:

NU-AGE FILMS® - FILM 6+

ICC ES | ICC ES PMG | ICC ES LISTED

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ICC-ES Listing Report

ESL-1009

Reissued December 2018

This listing is subject to renewal December 2019.

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CSI: DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 13 00—Sheet Waterproofing

Product Certification System:

The ICC-ES product certification system includes evaluating reports of tests of standard manufactured product, prepared by accredited testing laboratories and provided by the listee, to verify compliance with applicable codes and standards. The system also involves factory inspections, and assessment and surveillance of the listee's quality system.

Product: Nu-Age Films® – Film 6+

Listee: ISI BUILDING PRODUCTS

Compliance with the following standard:

Nu-Age Films® – Film 6+, when applied in accordance with the manufacturer's installation instructions, conforms to the following standard and has the properties noted in Table 1:

- ASTM D4397-10, Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications, ASTM International.

Identification:

1. Packaging of Nu-Age Films® carries a label indicating the manufacturer's name and address, the product name, the thickness of the sheeting, the listing number (ESL-1009), and when applicable, the listing mark.
2. The report holder's contact information is the following:

   ISI BUILDING PRODUCTS
   401 TRUCK HAVEN ROAD
   EAST PEORIA, ILLINOIS 61611
   info@isibp.com
   www.isibp.com

Installation: The product must be installed in accordance with the Insulation Solutions, Inc. installation instructions.

Conditions of listing:

1. This listing report addresses only conformance with the standard noted above.
2. The product, as listed, is non-color-tinted and translucent. The product has not been evaluated for reflectance, luminous transmittance or heat sealability.
3. Approval of the product's use is the sole responsibility of the local code official.

TABLE 1—PROPERTIES OF NU-AGE FILMS AS APPLICABLE TO ASTM D4397-10

Thickness (inches)	0.0024
Impact Resistance (g)	299
Tensile Strength at Break (length direction) Exceeds 1700 psi	Yes
Tensile Strength at Break (width direction) Exceeds 1200 psi	Yes
Elongation % at Break (length direction) Exceeds 225%	Yes
Elongation % at Break (width direction) Exceeds 350%	Yes
Reflectance	n/a
Luminous Transmittance	n/a
Permeance (Perms)	0.028
Heat Sealability	n/a

For **SI:** 1 inch = 25.4 mm, 1 psi = 0.0069 MPa

TDS

VERSION 21.0

Nu-Age Films®

6+ ENGINEERED POLY SHEETING

VAPOR RETARDERS

DIVISION
033000, 072600

PRODUCT NAME

Nu-Age Films® 6+ Engineered Poly Sheeting

MANUFACTURER

ISI BUILDING PRODUCTS
401 Truck Haven Road
East Peoria, IL 61611
866.698.6562 / www.isibp.com

PRODUCT DESCRIPTION

BASIC USE
Nu-Age Films are uniquely enhanced high performance vapor retarders that exceed performance properties of conventional single layer polyethylene sheeting. Nu-Age Films 6+ surpasses 6-mil polyethylene sheeting requirements outlined in ASTM D 4397. Nu-Age Films are used as multi-purpose high performance vapor retarders for numerous construction, industrial and agricultural applications. Nu-Age Films 6+ delivers excellent impact resistance, tensile strength and elongation for demanding vapor retarder and protective covering applications.

COMPOSITION & MATERIALS
Nu-Age Films are tri-layer extruded films manufactured and engineered using a distinct virgin resin formulation. The tri-layer extrusion uses separate extruders to produce different layers of polymers. The layers join, in the liquid state, just before they are extruded. The tri-layer manufacturing is desirable as it takes the best properties of different resins and links them together. The film structure is then engineered to perform better than its individual parts. Nu-Age Films 6+ is a lighter weight roll with increased product performance all while maintaining long-term stability.

SIZE
Available in roll sizes ranging from 8 to 20 feet wide by 100 feet in length. Special roll lengths are available upon request.

WEIGHT
Approximately 13.2 lbs per 1,000 ft^2 at .00275 inches (69.9 μ) thick.

BENEFITS
- Unrivaled material solution
- Made from premium grade virgin resin
- Enhanced performance
- State-of-the-art one-of-a-kind technology
- Lighter weight for ease of installation
- Outperforms 6-mil poly per ASTM D 4397
- Multi-use for construction, industrial and agricultural applications
- Superior value without forfeiting quality

TECHNICAL DATA

APPLICABLE STANDARDS

ASTM D 4397 Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

ASTM D 2103 Standard Specification for Polyethylene Film and Sheeting

ASTM D 1709 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting

ASTM F 1249 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials

ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

NOTE: All Nu-Age Films are tested by accredited, third-party testing agencies following stringent industry guidelines and testing standards.

ENVIRONMENTAL CONSIDERATIONS
Nu-Age Films can aid in controlling soil gas such as radon.

PHYSICAL PROPERTIES
Nu-Age Films 6+ exceeds 6-mil polyethylene sheeting performance properties outlined in ASTM D 4397.

INSTALLATION

UNDER-SLAB INSTALLATION

SUB-GRADE PREPARATION
Level and tamp or roll granular base as specified by the architectural or structural drawings.

VAPOR BARRIER PLACEMENT
Unroll Nu-Age Films with the longest dimension parallel with the direction of the pour. Unfold Nu-Age Films to full width.

Lap Nu-Age Films over the footings and seal to the vertical foundation walls with one of the following vapor barrier accessories: White Viper® Vapor Tape, Viper® Double Bond Tape, Viper® VaporPatch or VaporCheck® Mastic.

PROTECTION
When installing reinforcing steel and utilities, in addition to the placement of concrete, take precaution to protect Nu-Age Films. Carelessness during installation can damage the most puncture-resistant vapor barriers. Provide for additional protection in high-traffic areas.

Place standard reinforcing bar supports on Nu-Age Films. The strength characteristics of Nu-Age Films will help guard against possible punctures caused by reinforcing bar supports.

Avoid driving stakes through Nu-Age Films. If this cannot be avoided, each individual hole must be repaired.

If a cushion or blotter layer is required in the design between the vapor barrier and the slab, additional care should be taken, especially if sharp crushed rock is used. Washed rock will provide less chance of damage during placement.

These are very general installation instructions. Instructions on architectural or structural drawings should be reviewed and followed. Detailed installation instructions can be obtained by calling our corporate office at 866.698.6562 or online at www.isibp.com.

NOTE: These installation instructions are based on ASTM E 1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. These instructions are intended to be used as a guide and do not take into account specific job site conditions.

For further details, check with local building codes, ACI 302, ACI 360 and/or architectural/engineering specifications.

WARRANTY

Warranty information can be obtained by calling the manufacturer at 866.698.6562 or visiting www.isibp.com.

MAINTENANCE

Requires no maintenance once installed.

TECHNICAL SERVICES

Technical information and detailed test results can be obtained by calling the manufacturer at 866.698.6562.

FILING SYSTEMS

Additional information can be obtained by calling the manufacturer at 866.698.6562 or visiting www.isibp.com.

PROPERTIES **TEST PROCEDURE (INDEPENDENT TEST FACILITY)**	TEST METHOD **APPLICABLE STANDARDS**	RESULTS **IP UNITS**
THICKNESS	N/A	.00275 in | 69.9 µ
PERFORMANCE CLASSIFICATION	ASTM D 4397	EXCEEDS 6-mil
FILM TYPE	ASTM D 2103	TYPE 15233
PUNCTURE RESISTANCE	ASTM 1709 METHOD A	299 grams
TENSILE STRENGTH	ASTM D 882	4,860 PSI LD | 33.5 MPa 4,650 PSI CD | 32.1 MPa
ELONGATION	ASTM D 882	910% LD, 850% CD
WATER VAPOR PERMEANCE	ASTM E 96 METHOD E	0.028 perms* | 0.018 perms**
CHEMICAL RESISTANCE	N/A	UNAFFECTED
LIFE EXPECTANCY	N/A	INDEFINITE

**grains/(ft²*hr*inHg) **g/(m²*24hr*mmHg)*

ICC ES LISTED ESL-1009

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PHONE: 309.698.0062 / FAX: 309.698.0065

DARE TO COMPARE

ICC ES LISTED ESL-1009

6+

ASTM D 4397 PERFORMANCE PROPERTIES

PROPERTIES (ASTM)	NU-AGE FILM 6+	6-MIL PE SHEETING
Dart Drop (D 1709) Impact Resistance (Grams)	299	260
Tensil Strength (D 882) Lengthwise (PSI) / Crosswise (PSI)	4,860 / 4,650	1,700 / 1,200
Elongation (D 882) Lengthwise (%) / Crosswise (%)	910 / 850	225 / 350
Water Vapor Permeance (Perms)	0.028	0.13

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ISI BUILDING PRODUCTS®
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NU-AGE FILMS® 6+

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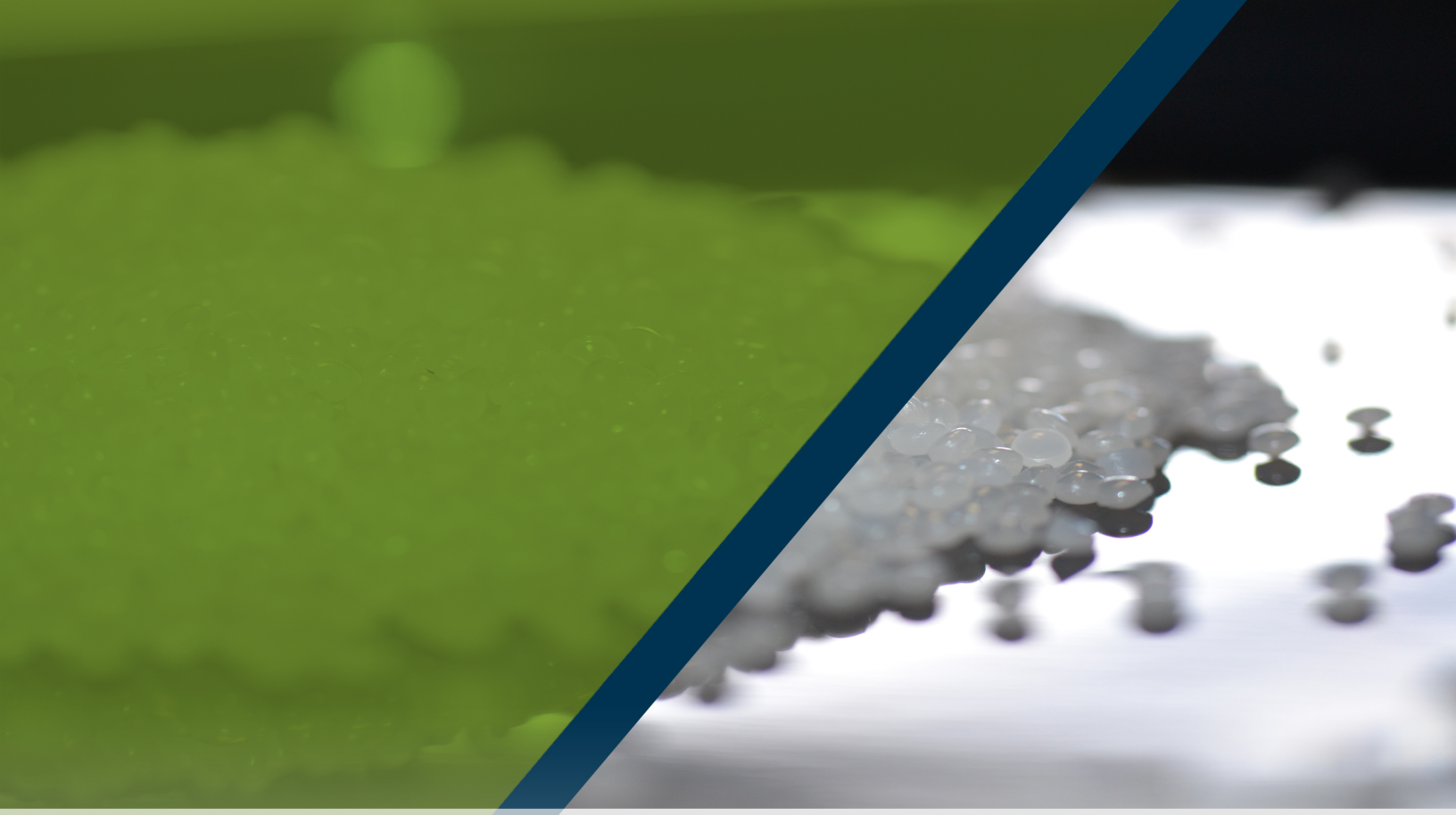
Thickness ASTM D 6988 Mils	Dart Drop Impact ASTM D 1709 Grams	Tensile Strength ASTM D 882 PSI (LD/CD)	Elongation ASTM D 882 % (LD/CD)	WVTR ASTM E 96 (g/24·h·100·in.²)	Permeance ASTM E 96 (perms)
1	40	1700/1200	200/325	1.40	0.76
2	85	1700/1200	225/350	0.70	0.38
3	125	1700/1200	225/350	0.47	0.25
4	165	1700/1200	225/350	0.35	0.19
5	205	1700/1200	225/350	0.28	0.15
6	260	1700/1200	225/350	0.23	0.13

ASTM D 2103 Classification: Film Type - 15233



Nu-Age Films®

ENGINEERED POLY SHEETING

4+

TDS

VERSION 20.0

Nu-Age Films®

4+ ENGINEERED POLY SHEETING

VAPOR RETARDERS

DIVISION
033000, 072600

PRODUCT NAME

Nu-Age Films® 4+ Engineered Poly Sheeting

MANUFACTURER

ISI BUILDING PRODUCTS
401 Truck Haven Road
East Peoria, IL 61611
866.698.6562 / www.isibp.com

PRODUCT DESCRIPTION

BASIC USE
Nu-Age Films are uniquely enhanced high performance vapor retarders that exceed performance properties of conventional single layer polyethylene sheeting. Nu-Age Films 4+ surpasses 4-mil polyethylene sheeting requirements outlined in ASTM D 4397. Nu-Age Films are used as multi-purpose high performance vapor retarders for numerous construction, industrial and agricultural applications. Nu-Age Films 4+ delivers excellent impact resistance, tensile strength and elongation for demanding vapor retarder and protective covering applications.

COMPOSITION & MATERIALS
Nu-Age Films are tri-layer extruded films manufactured and engineered using a distinct virgin resin formulation. The tri-layer extrusion uses separate extruders to produce different layers of polymers. The layers join, in the liquid state, just before they are extruded. The tri-layer manufacturing is desirable as it takes the best properties of different resins and links them together. The film structure is then engineered to perform better than its individual parts. Nu-Age Films 4+ is a lighter weight roll with increased product performance all while maintaining long-term stability.

SIZE
Available in roll sizes ranging from 8 to 20 feet wide by 100 feet in length. Special roll lengths are available upon request.

WEIGHT
Approximately 7.51 lbs per 1,000 ft^2 at .00155 inches (39.4 µ) thick.

BENEFITS
- Unrivaled material solution
- Made from premium grade virgin resin
- Enhanced performance
- State-of-the-art one-of-a-kind technology
- Lighter weight for ease of installation
- Outperforms 4-mil poly per ASTM D 4397
- Multi-use for construction, industrial and agricultural applications
- Superior value without forfeiting quality

TECHNICAL DATA

APPLICABLE STANDARDS

ASTM D 4397 Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

ASTM D 2103 Standard Specification for Polyethylene Film and Sheeting

ASTM D 1709 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting

ASTM F 1249 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulate16d Infrared Sensor

ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials

ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

NOTE: All Nu-Age Films are tested by accredited, third-party testing agencies following stringent industry guidelines and testing standards.

ENVIRONMENTAL CONSIDERATIONS
Nu-Age Films can aid in controlling soil gas, such as radon.

PHYSICAL PROPERTIES
Nu-Age Films 4+ exceeds 4-mil polyethylene sheeting performance properties outlined in ASTM D 4397.

INSTALLATION

Check with local building codes, ACI 302, ACI 360 and/or architectural/engineering specifications. Instructions on architectural or structural drawings should be reviewed and followed. Detailed installation instructions can be obtained by calling the manufacturer at 866.698.6562 or visiting www.isibp.com.

WARRANTY

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TECHNICAL SERVICES

Technical information and detailed test results can be obtained by calling the manufacturer at 866.698.6562.

MAINTENANCE

Requires no maintenance once installed.

FILING SYSTEMS

Additional information can be obtained by calling the manufacturer at 866.698.6562 or visiting www.isibp.com.

PROPERTIES **TEST PROCEDURE (INDEPENDENT TEST FACILITY)**	TEST METHOD **APPLICABLE STANDARDS**	RESULTS **IP UNITS**
THICKNESS	N/A	.00155 in | 39.4 µ
PERFORMANCE CLASSIFICATION	ASTM D 4397	EXCEEDS 4-mil
FILM TYPE	ASTM D 2103	TYPE 15232
PUNCTURE RESISTANCE	ASTM 1709 METHOD A	211 grams
TENSILE STRENGTH	ASTM D 882	3,550 PSI LD | 24.5 MPa 3,850 PSI CD | 26.5 MPa
ELONGATION	ASTM D 882	610% LD, 710% CD
WATER VAPOR PERMEANCE	ASTM E 96 METHOD E	0.19 perms* | 0.013 perms**
CHEMICAL RESISTANCE	N/A	UNAFFECTED
LIFE EXPECTANCY	N/A	INDEFINITE

**grains/(ft²*hr*inHg) **g/(m²*24hr*mmHg)*

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DARE TO COMPARE

4+

ASTM D 4397 PERFORMANCE PROPERTIES

PROPERTIES (ASTM)	NU-AGE FILM 4+	4-MIL PE SHEETING
Dart Drop (D 1709) Impact Resistance (Grams)	211	165
Tensil Strength (D 882) Lengthwise (PSI) / Crosswise (PSI)	3,550 / 3,850	1,700 / 1,200
Elongation (D 882) Lengthwise (%) / Crosswise (%)	610 / 710	225 / 350
Water Vapor Permeance (Perms)	0.19	0.19

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NU-AGE FILMS® 4+

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Thickness ASTM D 6988 Mils	Dart Drop Impact ASTM D 1709 Grams	Tensile Strength ASTM D 882 PSI (LD/CD)	Elongation ASTM D 882 % (LD/CD)	WVTR ASTM E 96 (g/24·h·100·in.²)	Permeance ASTM E 96 (perms)
1	40	1700/1200	200/325	1.40	0.76
2	85	1700/1200	225/350	0.70	0.38
3	125	1700/1200	225/350	0.47	0.25
4	165	1700/1200	225/350	0.35	0.19

ASTM D 2103 Classification: Film Type - 15232

VERSION 18.1

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