

# KUNISEAL C-31DS

Concrete Joint Waterproofing Material



The Solution For Your Waterleak Problems

# Kuniseal C-31 DS Installation Pictures

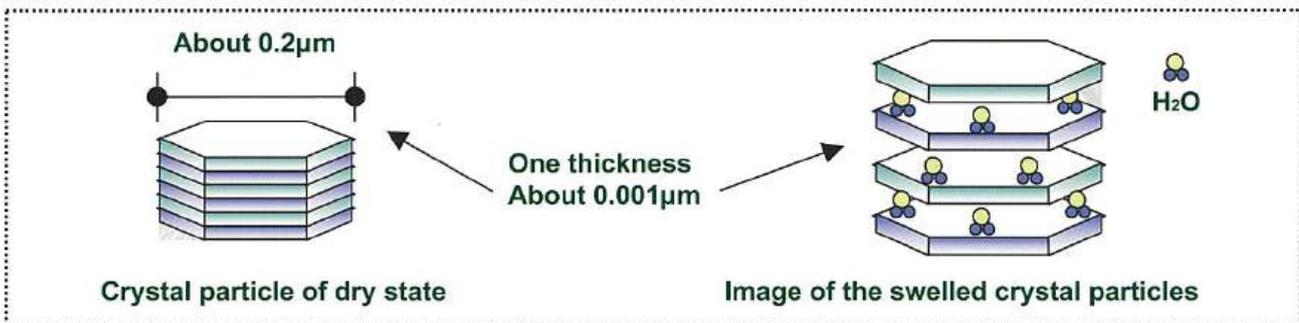


# Understanding Kuniseal C-31 DS

KUNISEAL C-31 DS is a water soluble plastic carrier containing an innovative bentonite and mineral oil sealer for concrete joints. The carrier gets sticky with a little water and the clay and oil stick together to make easy butt joints.

## 1. About bentonite: the principal ingredient

- Bentonite is a natural mineral clay containing montmorillonite, quartz, and opals, and is a mixture of big particles (quartz etc.) and very small particles (montmorillonite)
- Montmorillonite, the main component of sodium bentonite, is a crystal with many thin flaky layered sheets bound or laminated together, the thickness of each sheet is about 10nm (0.2 $\mu$ m) with a stacked height varying between 100-1,000nm(0.1-1 $\mu$ m).
- These crystal layered sheets give sodium bentonite its' swelling power. Water can be absorbed between the layers which cause the crystals to swell in size to form an impermeable mass that prevents the passage of water.



## 2. Simple To Use

- No special adhesive needed.
- Easy joined by butt joining ends together.
- Easy to cut, fit and form joins and corners.
- Can be applied on most construction substrates, concrete, pipes, steel etc.
- Stable under hot and cold temperatures.

## 3. Powerful Waterstop Performance

- The water stopping ability of Kuniseal C-31 DS comes from the swelling and shape changing of montmorillonite in bentonite.
- Kuniseal C-31 DS uses the water that is trying to come through the joint and any moisture in the surrounding concrete to swell the bentonite so that water will not move through the joint.

# Understanding Kuniseal C-31 DS

## 4. Self Healing Seal

When new cracks or fissures develop in the concrete around the Kuniseal C-31 DS, the bentonite mixture will move to fill those cracks.



## 5. Controlled Expansion of Seal

The oil in the bentonite mixture controls the speed of swelling by limiting how quickly water reaches the montmorillonite. This also prevents sudden pressure increase within new joints that might damage the concrete. This gives a longer construction window during rainy or snow weather without ruining the sealant before it can be covered.

## 6. No Damage To Concrete

Although a swelling sealant might cause some worry, sodium bentonite does not exert excessive force. Bentonite tends to move toward voids and cracks, instead of exerting all of the force in one place. The wet montmorillonite forms a gel which blends into the cracks in the construction joint. Sodium bentonite is “friendly” to concrete joint applications in so many ways.

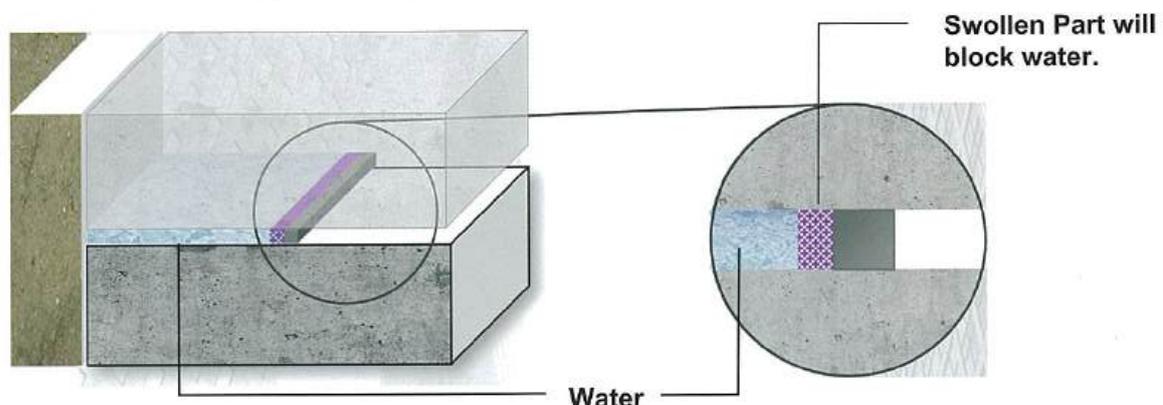
## 7. Extreme Durability

Sodium bentonite is a natural inorganic mineral that does not dissolve or break down like plastic and rubber sealant. Kuniseal C-31 DS can repeatedly swell and shrink depending on wetness or dryness. Unlike other swelling sealants, Kuniseal C-31 DS can be expected to be a permanent sealant.

## 8. Many Uses

Kuniseal C-31 DS can be used to protect embedded H and I steel beams from water. Kuniseal is also used to seal penetrations like pipes, conduits or channels. It makes a useful crack repair sealer with proper cement or mortar covering. The greatest use is as a cast-in-place concrete joint seal along horizontal surfaces, vertical surfaces, irregular surfaces and wire nets.

## 9. Theory of Waterproofing



# HOW TO INSTALL KUNISEAL C-31 DS



BRUSH OFF DIRT AND WET CONCRETE JOINT.



**OR** WET KUNISEAL.



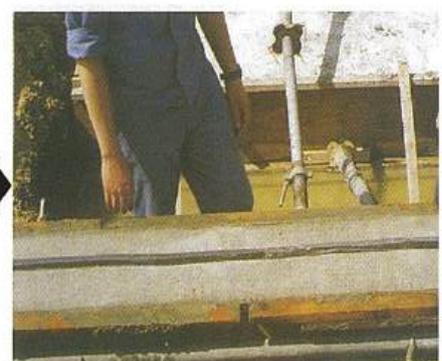
PLACE KUNISEAL ON JOINT AND PRESS IN PLACE.



FORM AND PRESS KUNISEAL TO SLAB OR PENETRATIONS.



CONNECT TWO PIECES BY BUTT JOINT AT ENDS.



AFTER DRYING, KUNISEAL SHOULD STICK TO THE CONCRETE.

**DO NOT REMOVE OUTER PLASTIC FILM! IT IS AN ADHESIVE!**



Press Kuniseal to look triangular, never press flat on the joint. Joining two pieces; pinch each piece into a triangle shape ensure they join without any opening or gap.



## **Safety precautions:**

Kuniseal C-31 DS is designed for non-moving construction joints only, they are not expansion joints. 1.2" (30mm) minimum of concrete coverage is required on all sides of Kuniseal C-31 DS.

An accepted expansion joint material must be used for moving joints.

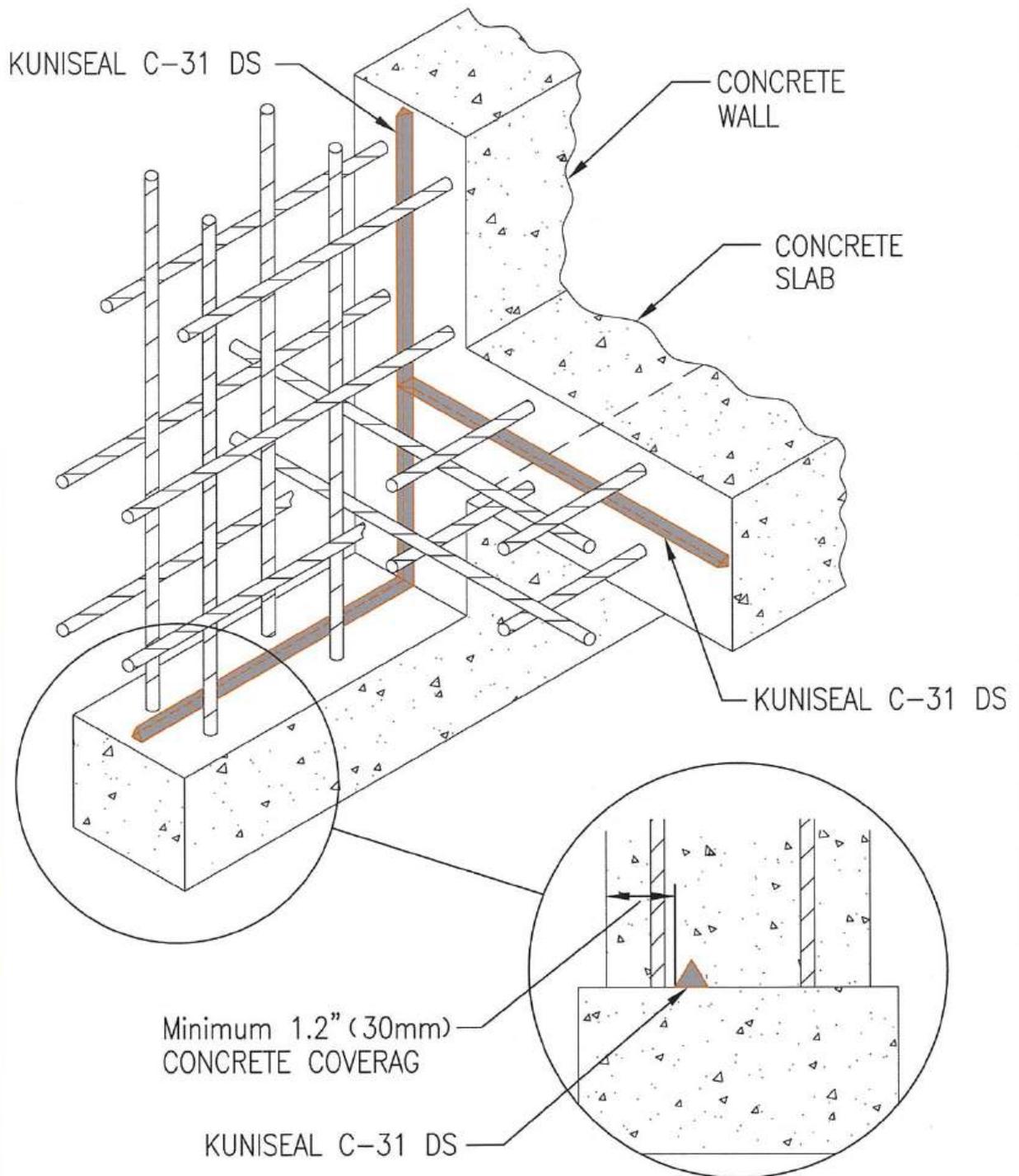
Reseal cartons after use. Keep dry as the adhesive film could start to melt in excessive humidity or rain contact.

## **Storage**

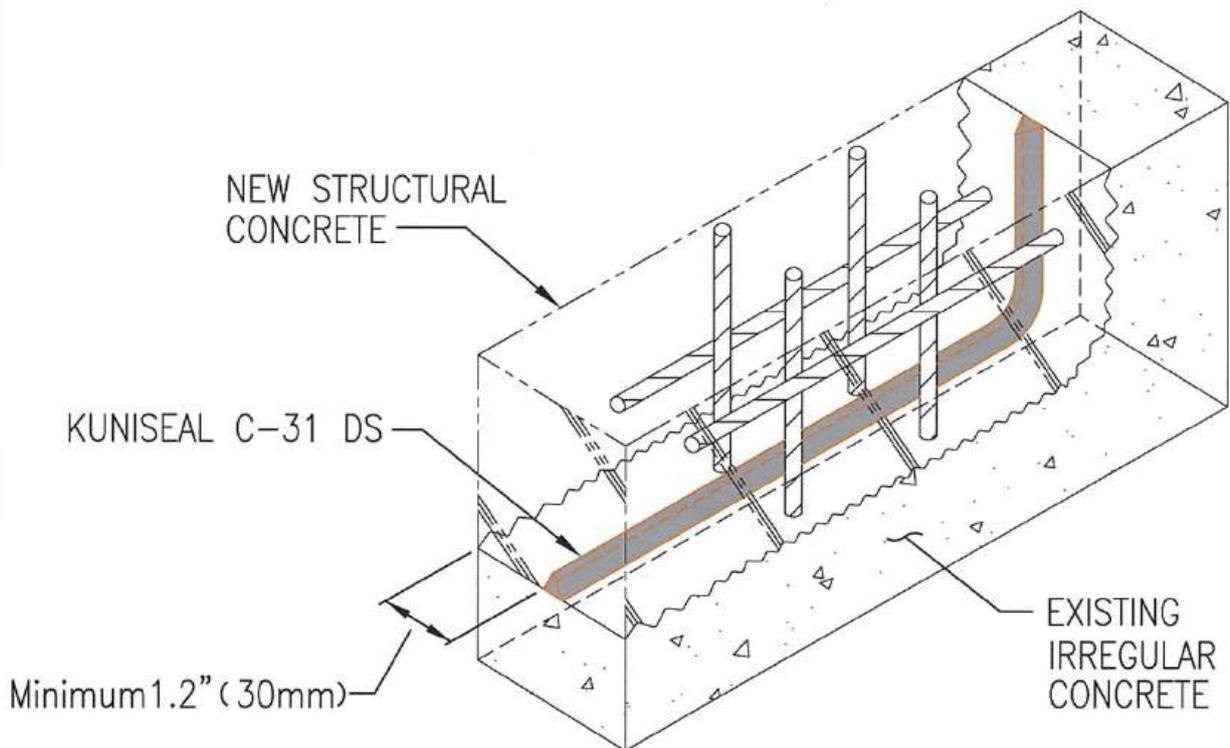
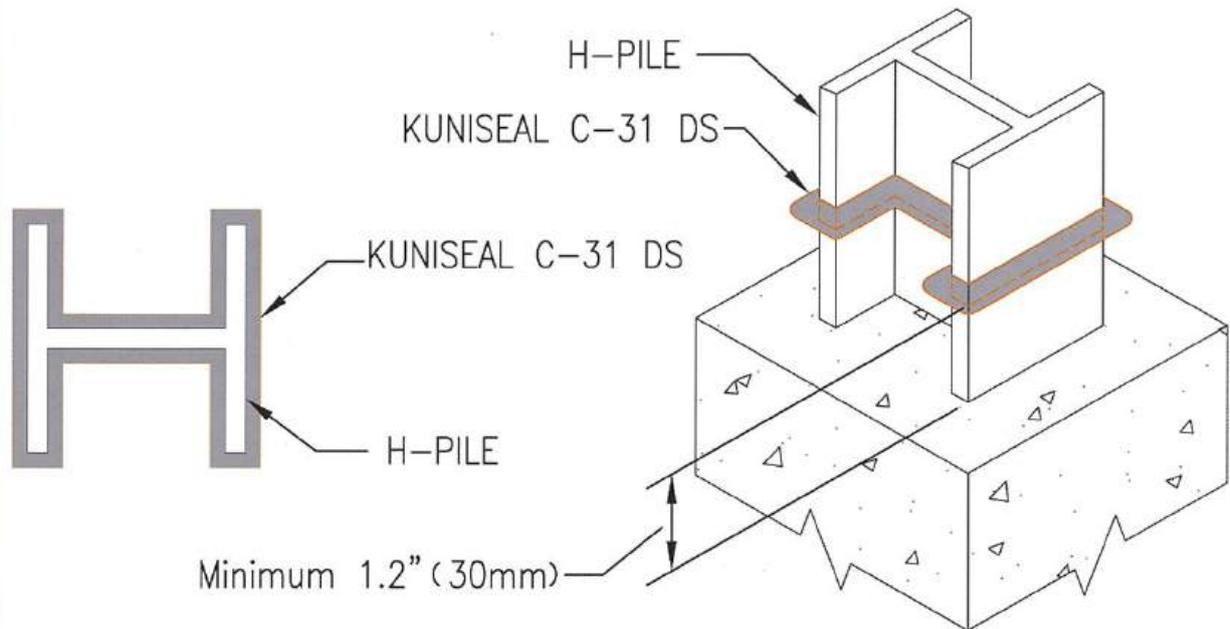
Store under cover, out of direct sunlight and protect from extremes of temperature and moisture.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging.

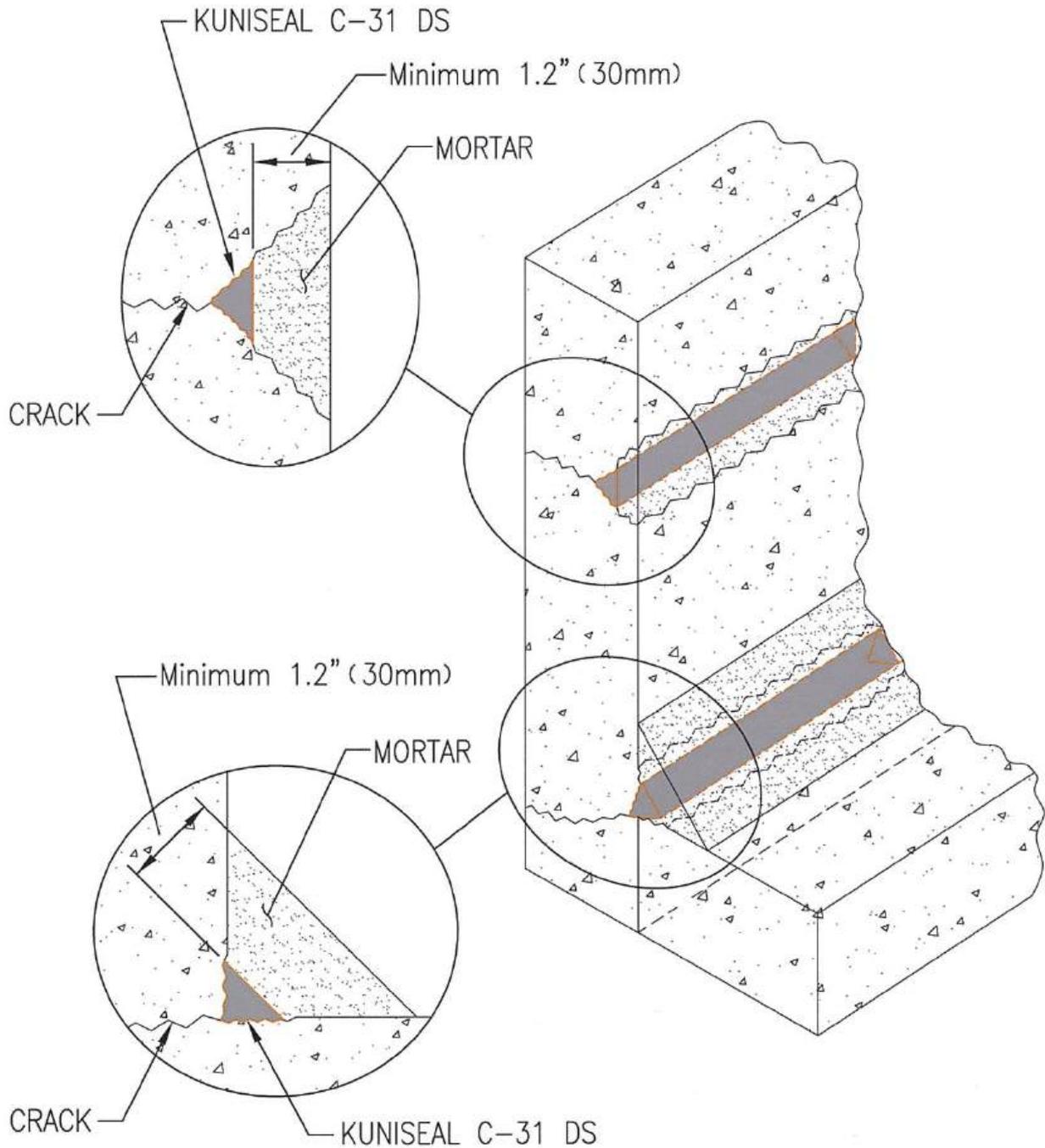
# STANDARD APPLICATION DETAILS - 1



## STANDARD APPLICATION DETAILS - 2



# REPAIRING WORK DETAIL - 3



# TYPICAL INFORMATION

## 1. Chemical Composition

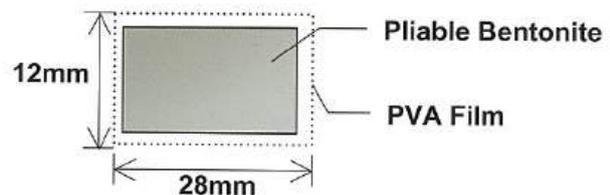
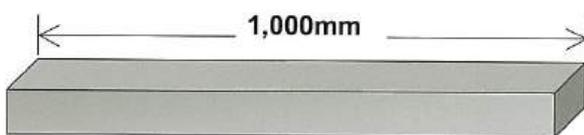
Bentonite	% by Weight	≤70%
Oil Compound	% by Weight	≤40%
Polymer-modified bitumen	% by Weight	≤30%

Please review MATERIAL SAFETY DATA SHEET (MSDS) before using Kuniseal C-31DS.

## 2. Test Results

Description Of Test	Test method	Result
Specific Gravity @25°C	ASTM D71	1.403
Penetration ( 0 strokes	ASTM D217	99
Penetration ( 60 strokes	ASTM D217	84
Flash point ( Min.	ASTM D93 Pensky-Martens	>250°C (>482°F)
Pour point ( Max.	ASTM D97	Solid @ ambient temp. >25°C (>77°F)
Adhesion to concrete	Measurement after 1 day	632.7gf/cm <sup>2</sup>
Adhesion to Iron plate	Measurement after 1 day	296.7gf/cm <sup>2</sup>
Swelling rate	Soaking one side in water for 24hours	>110%
Hydrostatic Pressure Resistance		0.5 Mpa/72.5psi

## 3. Dimensions and Packaging



Dimensions	H12 x W28 x L1,000mm
	H0.47" x W1.1" x L3'3"
Carton contents	20 meters (65.6 feet)
Carton Weight	9.6kg (21.2 lbs)

# SWELLING TEST

## 1. Test Description

Test Kuniseal C-31 DS for expansion after exposure to water-based fluids in a transparent acrylic beaker.

## 2. Test Method

2-1. Test device

The test device is a transparent, acrylic beaker to measure swelling of the wetted sample.

2-2. Testing specimen

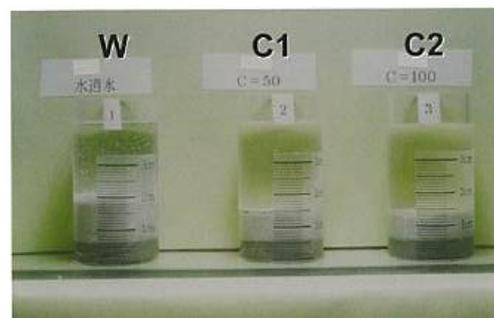
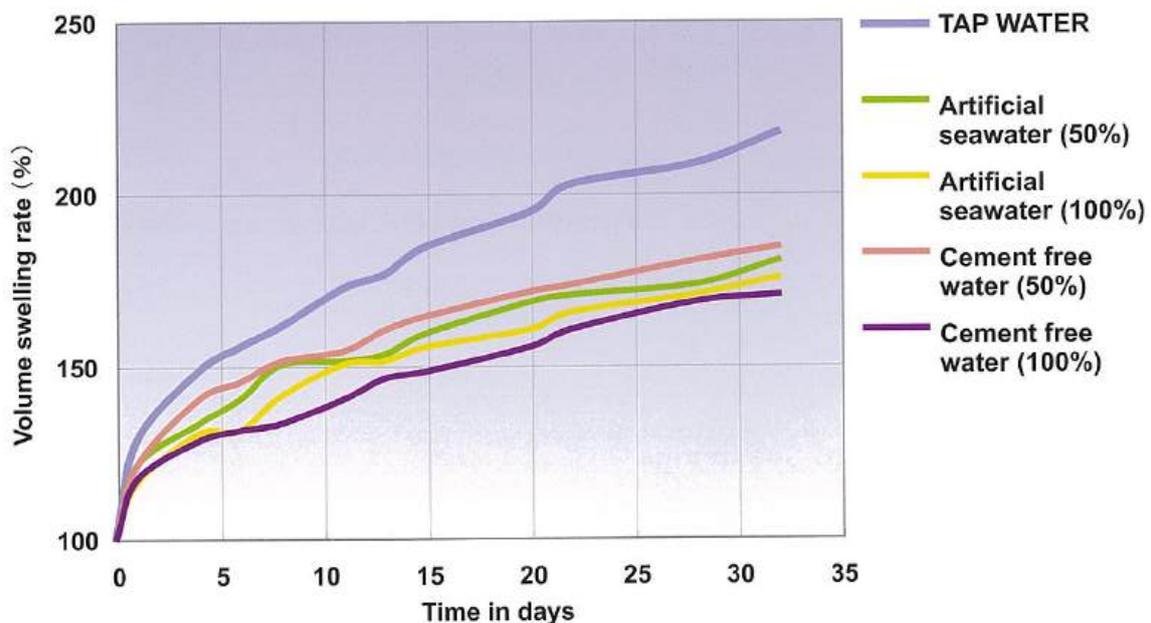
Kuniseal C-31 DS was rolled out to 1cm in thickness as a test specimen.

## 3. Test Procedure

Kuniseal C-31 DS was rolled out to 1cm in thickness and was placed in the bottom of a beaker (Refer to the above figure). Three water-based fluids (tap water, cement separation water, and artificial sea water using ASTM standard formula) are used to cover three samples of Kuniseal to 1cm. The beaker is sealed to avoid evaporation and the height of the sample is measured at the room temperature daily for over 30 days.

## 4. Testing Result

The height of the sample was shown as swelling rate (The first set stage is assumed to be 100%) in line with the every elapsed time.



W = Tap Water C1=50% Cement free Water C2=100% Cement free Water

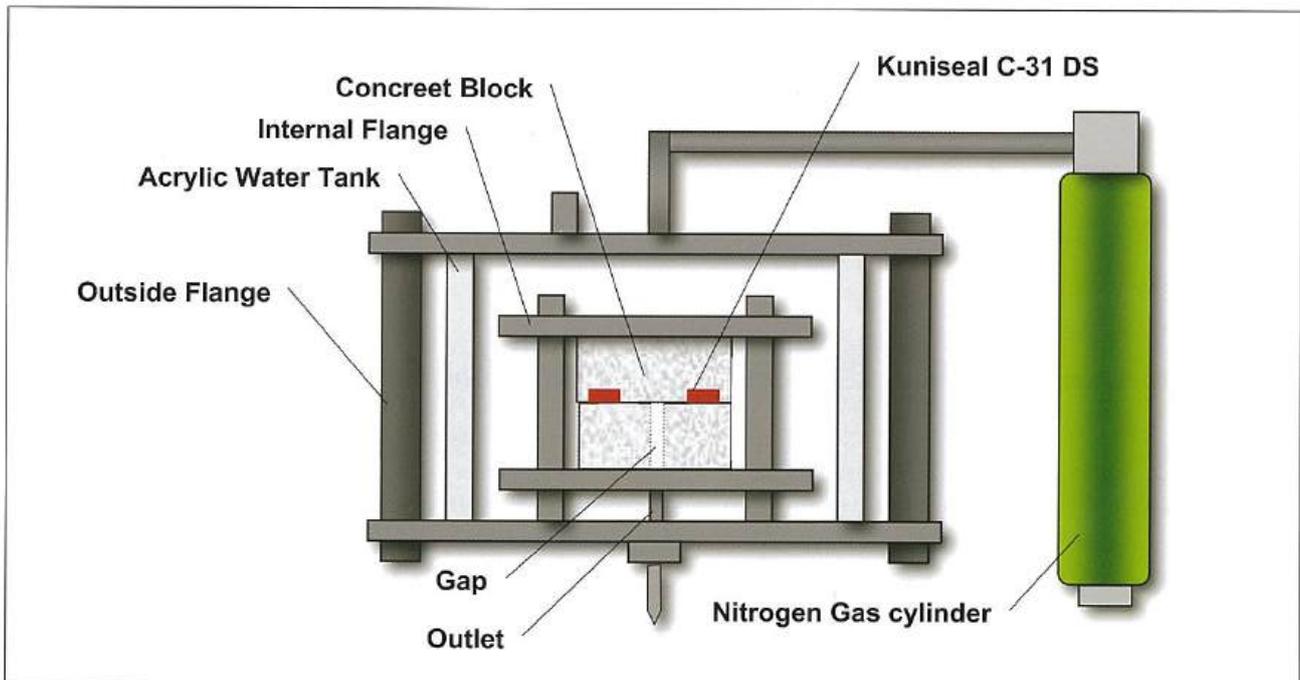
# WATERSTOP PERFORMANCE TEST

## 1. Test Description

Test Kuniseal C-31 DS using pressurized test chamber and cylindrical concrete test pieces to simulate a circular joint exposed to by both tap water and ASTM standard artificial sea water.

## 2. Test Device

The test device shown in below figure is a cylindrical pressurized vessel with a fixture for holding concrete test pieces cast in a cylinder shaped form.



## 3. Concrete Block and Test Specimen

### 3-1. Test piece

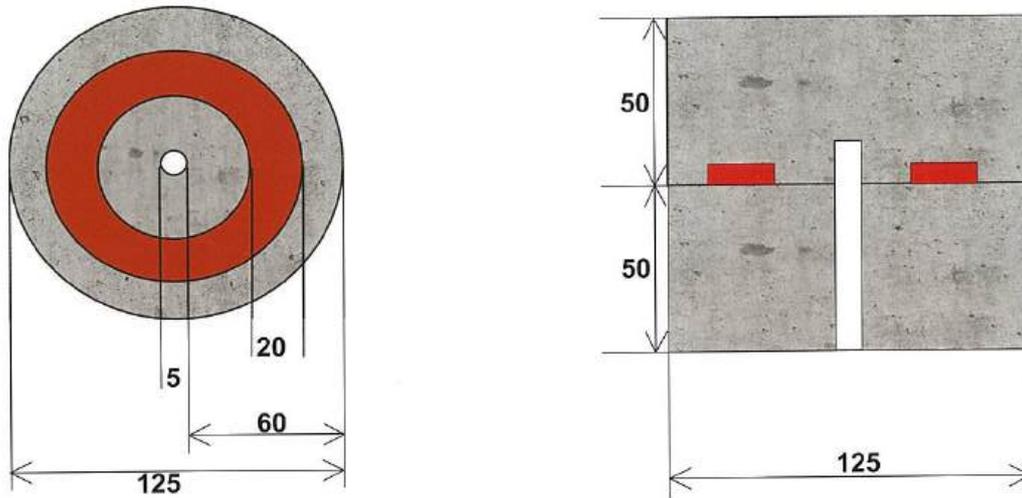
Kuniseal C-31 DS 20mm W x 5mm H was used.

### 3-2. Preparation of concrete pieces

Ready-mixed concrete for general construction was cast in a cylinder shaped form. After a week of curing, concrete base was removed and drilled and fitted with a drain outlet (diameter : 5mm) in the center. The poured concrete top was made after kuniseal C-31 DS had been positioned as shown in the figures below. The test assembly was allowed to cure again for one week. Another similar assembly was made without the sealing material and use as a control test assembly.

**3-3. Size of Test Assembly**

Below figure shows the dimensions of the test assembly.  
(Shown in millimeter)



**4. Test Procedure**

The test assembly was fixed in an acrylic water tank and sealed with an external flange. Tap water and later artificial seawater was used to soak the test assembly and activate the seal. Pressurized nitrogen was gradually added to the water tank up to 72.50psi (same value with 0.5Mpa and 5Kgf/cm<sup>2</sup>). The waterstop performance was evaluated by measuring the amount of water that leaked out of the drain immediately after pressure was applied and again after one week. The Control test assembly ( without a sealant of Kuniseal C-31 DS) was simultaneously tested, water leaked immediately after 1/10th of the test pressure was applied.

**5. Testing Result**

Test specimen	Measurement	Pressure (psi)	Pressure (Mpa)	Pressure (Kgf/cm <sup>2</sup> )	Amount of water leak oz/min
Blank (no seal)	Immediately after	7.25	0.05	0.51	0.85
KUNISEAL C-31 DS In Tap water	Immediately after	72.5	0.5	5.1	0
	1 week later	72.5	0.5	5.1	0

**6. Consideration**

The test assembly with Kuniseal C-31 exhibited no leakage from tap or artificial sea water. The unsealed control test assembly exhibited considerable leakage with only 10% of the test pressure applied.

# BOND TEST ON CONCRETE AND STEEL BOARD

## 1. Test Item

Testing methods for shear strength of adhesive bond by compression loading  
(Conform to JIS K 6852. )

## 2. TESTING METHOD

### 2-1. Testing device

The testing device consists of a digital force meter, a stand, and a pulling frame. Two bonding surfaces were used a concrete board, and an iron plate.

### 2-2. Testing specimen

Kuniseal C-31 DS was packed into the sample holding ring with inside dimensions of 5cm L x 3cm W x 1.5cm H. Kuniseal C-31 with and without the outer water soluble film/carrier was tested.

## 3. OPERATION METHOD

The pulling frame is put on a concrete surface. Water is applied to the surface and both Kuniseal C-31 DS with and without the outer water soluble film/carrier were applied to the concrete surface under constant pressure.

Using the digital force gauge installed in the stand, the pulling frame is raised at the speed of 50mm/min, and adhesion force per each unit area is calculated.

## 4. TESTING RESULT

	Adhesion Surfaces	Sample	Measurement result	
			After 1 day (gf/cm <sup>2</sup> )	3 days after (gf/cm <sup>2</sup> )
KUNISEAL C-31 DS	Concrete	Kuniseal C-31 DS without water soluble film/carrier	121	124
		Kuniseal C-31 DS with water soluble film/carrier	127	130
	Iron plate	Kuniseal C-31 DS without water soluble film/carrier	77	77
		Kuniseal C-31 DS with water soluble film/carrier	79	79



# Frequently Asked Questions

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**Q: Will rain affect Kuniseal before concrete is poured ?**

Solution: Kuniseal C-31 DS sealing properties are unaffected by a small shower. Please remove standing water and cover forms or trenches with plastic tarps. Running water washes away the adhesive film.

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**Q: How long before Kuniseal C-31 DS should be covered with concrete ?**

Solution: Kuniseal C-31 DS is not affected by freezing, light rain or sunshine, when protected from standing or moving water. Care must be taken not to step on or drop materials on Kuniseal that has been placed in a trench or form.

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**Q: Does Kuniseal C-31 DS swell in hot water ?**

Solution: Yes, Kuniseal C-31 DS will swell in Hot Water. Water temperature has no influence on Kuniseal C-31 DS's efficiency.

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**Q: Does the swelling speed decrease after repeated wet and dry cycles ?**

Solution: No, swelling speed does not decrease after repeated wetting and drying. However the appearance of Kuniseal changes after drying.

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**Q: What is the shelf life of Kuniseal C-31 DS ?**

Solution: Kuniseal has a shelf life of 3 years when stored in it's original containers in a dry and dark indoor storage area.

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**Q: Does Kuniseal swell rate change in Acid or Alkaline environments ?**

Solution: Yes, Kuniseal C-31 DS is Alkaline (pH10) and is most efficient in the pH range of 4-12. The swell rate is reduced in high acid situations.

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**Q: Can Kuniseal C-31 DS be installed by nail ?**

Solution: Yes, Kuniseal C-31 DS is a putty-like material. The nail will be sealed when covered and surrounded with waterstop. We recommend nailing for vertical installations.

**Q: Can Kuniseal C-31 DS be installed after rebar ?**

Solution: Yes, in most cases Kuniseal can be installed if there is room for hands and arms. Kuniseal is easy to cut and butt-join on most surfaces.

**Q: What is the plastic film covering on Kuniseal C-31 DS ?**

Solution: The film is a water soloube plastic. It acts as an adhesive between the waterstop and the concrete. Please don't peel off the film except for butt joints and crack repair.

**Q: How much concrete coverage is necessary ?**

Solution: Please provide at least 1.2" (30mm) of concrete coverage on all side of Kuniseal C-31 DS for maximum water stopping.

**Q: Can Kuniseal C-31 DS be used in cold environment?**

Solution: Yes, Kuniseal C-31 DS can be used at any temperature that concrete can be poured.

**Q: How do you fix Kuniseal C-31 DS that was stepped on or crushed?**

Solution: Attempt to reform the Kuniseal into a triangular cross section. If not possible, remove and replace the crushed section with new.

**Q: What is the difference in Swelling and expansion?**

Solution: Kuniseal C-31 DS Bentonite changed volume when wet, we can call it "Swelling". When Kuniseal swells, it creates very little pressure that might crack a joint.

**Q: Can Kuniseal C-31 DS be installed without a concrete covering ?**

Solution: No. Kuniseal C-31 DS works with the concrete or mortar covering to seal water out of the joint. The covering protects the bentonite from moving too far away from the joint.

**Q: Does the Kuniseal C-31 DS degenerate in concrete ?**

Solution: No. Kuniseal C-31 DS is a self-healing waterstop. Rubber or Butyl based materials become less effective over time and do not self-heal.

# KUNISEAL C-31DS

## Concrete Joint Waterproofing Material

### WARRANTY:

The Seller warrants that at the time of shipment, its products are free from defects in material and workmanship. There is no expressed warranty, the manufacture, (Kunimine Industries Co., Ltd.) and or their agents, known as (Seller) disclaim any implied warranties including but not limited to the warranty of merchantability and fitness for any particular purpose indicated to buyer by Seller. Seller's sole obligation under this warranty shall be, upon prompt written notice by the Buyer of any defects, and in spection, if required by the Seller, to replace or at Seller's option to allow a credit for any defective products expressly warranted herein against defects by Seller. Upon purchase of Seller's product(s), it is expressly agreed upon by Buyer that this remedy of replacement or credit, at Seller's option, is Buyer's exclusive remedy under this warranty, in no event shall Seller be liable for consequential loss or damages.

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