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Introduction

Oak Ridge™, a trademark of Coating Holdings Limited (CH LTD), is a Wisconsin USA based company. We specialize in Polyurea/Polyurethane protective coatings, foam insulation products, and Graco High Pressure spray equipment. We strive to provide the industry with protective products for severe corrosion and need to wear applications. CH LTD has continued to provide products which are user-friendly and of the highest quality raw materials available today. Along with the ability to custom formulate specialty chemicals in unique applications we are committed to providing solutions that have proven themselves in the field. With manufacturing facilities located in both the USA and Canada we are logistically suited for economical shipments and prompt delivery times. We can either set you up to do the work or we can get it done for you!!

CHLTD provides these major product groups:

- 100% Solids Polyurea Coatings
- 100% Solids Polyurethane Coatings
- 100% Solids Polyaspartic Coatings
- Solvent-Based Polyaspartic Coatings
- Polyurethane roofing insulation
- Polyurethane wall foam insulation
- Primers/specialty items
- Equipment sale of Graco and GlasCraft
- Turn Key spray rigs

CHLTD also offers these services:

- Training at our location or yours
- On site demonstrations/training
- Mobil application crews located nationally
- CH LTD's infield application crew
- Custom Formulating
- Equipment/Sprayer training
- Specialized three day foam school

Unique Qualities of the CH LTD Coatings Product Line:

Abrasion Resistance:

When evaluating abrasion application one must always remember that each has its own distinguishing characteristics. One must take each individually and determine the thickness of coating and the hardness required. Always call CH LTD for recommendations on abrasion type applications. Here are a few guidelines for evaluation only.

1. Elastomeric coatings do not wear exponentially. Doubling coatings thickness may result in 4-5 times the wear of the original thickness.
2. In most abrasion applications the softer the coating the better for wear. This is the case mostly in the case mostly in small particle applications, ¼” minus. Usually an 80A-95A would be used here.
3. On applications where rubber is used for wear, the OR80HA will last up to 2-3 times longer at the same thickness!
4. Our coating will wear much better in slurry type applications due to the cooling effect of the water or liquid used to make the slurry. Dry applications will create heat, therefore causing more wear
5. Always remember that testing samples on severe applications or on areas of uncertainty is ALWAYS recommended.

Sand Slurry Abrasion Comparison

Urethane	8
UHMWPE	21
Natural Rubber	55
AR Steel	62
304 Stainless Steel	80
Carbon Steel	100
High Density PE	307
Fiberglass	307
Stone hard	435
PVC	532
Neoprene	800
Wood	907
6061 Aluminum	1042

The above values are based upon relative weight loss in 50/50 sand slurry-rotated 7 hours at 1725 rpm.

Coefficient of Friction

<u>Substrate/Lining</u>	<u>Static</u>	<u>Kinetic</u>
Steel/Steel	.50	.40
Steel/UHMWPE	.30	.26
Steel/Urethane	.31	.25

The materials tested are generic. The various brand name manufactured products may exhibit higher or lower values depending upon formulation and test methods conducted.

The sole intent of the above is to provide the end user with a guide in the selection of abrasion resistant materials.

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Corrosion/Chemical Resistance: (see next page)

Polyurea and Polyurethanes have good overall chemical resistances. The general rule of thumb is the harder the coating the better its chemical resistance. All of CH LTD's coatings are corrosion resistant. With the aid of the CH LTD primers, immersion applications work excellent for moisture impermeability.

1. Normal temperature resistances of the CH LTD product line are up to 200°F and as low as -50°F. We do carry a high temperature coating, OR65HT which has temperature capability reaching 450°F!
2. Coating applications which require protection from chemicals with elevated temperatures will in most cases require testing application.
3. Normal operating PH levels are 3-11. PH levels higher than 11 or lower than 3, requires testing in the solution. Levels below 2 and above 12 are not recommended.
4. Always keep in mind, that in most cases, the fumes released from the chemical are worse then the liquid itself.

NOTE: Always remember to test the application if there is ever any doubt as to whether a coating is compatible. The test is done by completely encapsulating a metal coupon with the desired coating at the desired thickness and weighing it. Then take the sample and completely submerge it in the solution for 7 days at the temperature it will be used in. After the 7 days pull it out and weigh it, if there is a 5% or less weight change the coating is 99% compatible (see next page).

Noise Abatement:

1. Elastomeric coatings are natural insulators and also offer noise reduction. Normally the softer the material the higher the reduction.
2. At 40 mil (.040") our 80A coating will reduce the noise decibel level by 7-10 decibels, doubling this thickness will also double the noise reduction.

Electrical Qualities for a OR95 Shore A Elastomeric as per ASTM D150-74 and ASTM D149-64

	<u>F°</u>	<u>0.1 kHz</u>	<u>100 kHz</u>
Power factor at:	75	7.25	4.35
	158	6.65	4.75
	212	8.75	4.00
Dielectric constant at	75	9.25	7.69
	158	11.65	9.74
	212	12.19	9.98
DC Volume resistivity			
Ohm Cm at:	75	3.7×10^{12}	
	158	2.0×10^{11}	
	212	1.1×10^{11}	
Conductive grade:	75	1×10^4	
Anti Static grade:	75	1×10^6	
Surface resistivity at 75° Ohm cm	50% relative humidity		
Impressed voltage-600	4×10^{13}		

Insulation Qualities:

1) The insulating values of polyurea/polyurethane are as follows for the different hardnesses for 1" thick and can be calculated down for the desired thickness.

80A-0.917 BTU/ (hr) (sq.ft.)(F°/in).

95A-0.862BTU/ (hr) (sq.ft.)(F°/in).

60D-0.754TU/ (hr) (sq.ft.)(F°/in).

This is the thermal conductivity value, which is defined as the amount of heat per unit time passing across a unit area through a thickness of material for unit temperature differences in the direction of the thickness. This is called the "k" factor.

Deflection/Impact:

1) An elastomeric coating must have enough thickness to create physicals that will withstand a "load".

Influencing factors are lump six, height of the drop, velocity of the material, weather the material is wet or not and angle of impact. Always contact CH LTD for a recommendation regarding a suitable coating system. The following is a simple guideline:

Elastomeric coatings can be deflected to approximately 20% of their original size or thickness. If this is exceeded premature coating degradation may occur. The deflection rate will decrease with higher durometers and increase on lower durometers. For examples, if you had a piece of coating that was 10" thick the maximum you would want to deflect would be 2" (20%), whereas if the thickness is 250 microns (.010") then the maximum deflection would be reached at 50 microns (.0002"). As you might imagine, thicker is better if there is any question regarding the application.



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Fire Resistance/Retardancy:

- 1) The ORE84 has a special fire retardant additives added to it and is currently being tested. This test is the SATM-E84. NOTE: other systems are currently in testing. Please call for details.

UV Stability/Color Retention:

- 1) All elastomeric coating will yellow and darken after being exposed to the sun's Harmful UV rays. Along with discoloration the coating will also have surface chalking occur. This will not harm the physical properties of the material; it only affects the very surface (.001") of the coating/ both of these occurrences can be eliminated by simply using the OR95AL, ORBLUV LP/LT, ORGFC (UV stable, color fast, but will still surface chalk), or the ORDCLR (a solvent based UV stable, color fast, but will still surface chalk) If the highest physical results are required in a UV sealable aliphatic, then the "Extreme Marine" 100% solid batch mix may be required, call for details. If color stability is required with surface gloss retention, then a "2K" polyurethane top coat (paint) must be used, within one hour of coating application.

Because of the high cost of the color fast UV stable coatings most will use the latter of the three. However, a slight color change is not an issue in most applications where physical performances are only what is required.

Conclusion

In conclusion, Oak Ridge, a Trademark of Coating Holdings Limited, is committed to providing the industry with the highest quality chemicals, economically. From once being an applicator, CHL has grown to the chemical research and development of the most unique and diverse coating systems available today. We also provide unmatched customer support from everything to the planning of a project to actually assisting with it. We, or one of our portable service applicators, are always available at a moments notice and we are located nationally. Combined with the sales and service of the equipment necessary for application, Coating Holdings Limited is truly a turn key company.



SURFACE PREPARATION METHOD

The information contained herein is provided to act as a guide only in selecting an appropriate surface preparation method for use with Coating Holdings product line

The importance of good surface preparation to create bond strength to the substrate cannot be stressed enough. The success of Coating Holdings is directly related to the quality of adhesion.

Coating Holdings relies on mechanical adhesion meaning surface roughness or anchor patterns to ensure the best possible bond.

METAL (General)

Prior to any substrate preparation all grease, oils and other contaminants must be removed by either detergent cleaning or solvent washing. Heavily oiled metals should be heat treated, and then solvent washed. In all cases, the substrate should be dry before proceeding with the chosen preparation method.

All weld splatter and slag must be removed by grinding smooth prior to surface preparation. Sharp edges and corners should be rounded. Weld flux should be removed.

Special attention should be paid to bolts or rivets to ensure a good surface preparation, as they can often be cause of premature coating failure.

The cleaning of blasted surfaces is important. The best method is to brush clean and vacuum to remove all blasting media, dust and dirt prior to the priming operation.

Coating Holdings recommends immediate priming of all blasted articles after proper cleaning.

CARBON STEEL:

The best preparation method is NACE #1 or SSPC SP 5-63 White metal. Blast to a minimum anchor pattern of 37.5 to 50 microns (1 ½ to 2 mils)

The second and probably the most practical acceptable method is NACE #2 or SSPC SP 10-63 Near White metal Blast to a minimum anchor patter of 37.5 to 50 microns (1 ½ to 2 mils).

The blasting media used in the above preparation methods greatly influences the profile and the ease of which a given surface is cleaned. Black Beauty 4016 has proven to be a most reliable and effective abrasive in preparing carbon steel for good adhesion with Coating Holdings Urethane Coatings. Other abrasives such as flint shot, aluminum oxide and steel grit are acceptable medias. Do not use steel shot, glass beads or beach sand.

Blasting pressure should be a minimum 80-psi using oil free air lines and moisture traps

Blasting operations in the field are limited to relative humidity of 85% or less. The surface temperature of the steel at its coldest point must be at least -15°C (5°F) above the temperature of the dew point.

The third, but most controversial method is that of cold or hot phosphate and pickling surface treatments. Many claims have been made to the overall effectiveness of these methods but none have proven reliable. Coating Holdings strongly suggests testing adhesion prior to full-scale application, as there are many different formulations available. However, should any of these methods be chosen, it is necessary to completely neutralize the treatment and allow it to dry prior to application of primer coat.

Power tool cleaning, wire brushing and solvent wiping are the least effective methods of surface preparation. Coating Holdings does not recommend the use of these methods for successful bonding of urethane coatings.

STAINLESS STEEL:

Best prepared by grit blasting as described for Carbon Steel. Our experience has shown and aluminum oxide of 24 grit at a minimum air pressure of 80 psi provides a good surface preparation for bonding

Primer selection – For bonding, Coating Holdings Sprayable or Brushable Urethane Coatings use Coating Holdings Urethane to Metal Primer.

ALUMINUM:

Best prepared by grit blasting as described for Carbon Steel and Stainless Steel.

Primer selection – For bonding, Coating Holdings Sprayable or Brushable Urethane Coatings use Coating Holdings Urethane to Metal Primer.

For bonding rubber or urethane sheet stock to metal, use or Coating Holdings rubber to metal primer.

CONCRETE:

Coating Holdings recommends either a normal or hard troweled concrete surface for the application of urethane coating of less than 0,8mm (.032"). For coating thicknesses of greater than 1mm (.040") wood floated concrete is acceptable.

For swept concrete finishes a minimum thickness of urethane coating should be 1,5mm (.060")

For surfaces poured against forms contact our office as the process for coating preparation can be quite involved

New concrete must be allowed to cure and dry for a minimum of 30 days prior to any coating application. After this time, test the concrete for moisture by placing a sheet of heavy gauge plastic film approximately 12 inches square taped to the cured concrete surface in places considered to be slow drying. If the concrete is not dry, moisture will appear on the concrete side of the plastic film or the concrete will be darker or damp indicating the presence of moisture. Do not apply any coating until the concrete is thoroughly dry.

Oils, greases and waxes must be thoroughly removed for concrete. This is usually accomplished using a 1 kg. Blend of trisodium phosphate to 4 liters of 71 °C (160°F) hot water. Scrub the area repeatedly until the contaminants are removed. Wash the area with clean water and allow drying before continuing surface preparation.

If concrete curing compounds are used they must be removed and the concrete allowed to dry as previously stated. Blasting is the best method for removal of these curing compounds.

The two common forms of concrete surface are sandblasting and acid etching. Sandblasting is the preferred method especially when walls, ceilings or other irregular shaped articles are involved. Use a medium / fine blasting media, usually 16 to 40 mesh, so that damage such as cratering is kept to a minimum, yet heavy enough to remove concrete laitances.

Acid etching is accomplished by diluting concentrated hydrochloric or muriatic acid with 3 or 4 parts of water, applying it to the concrete and allowing it to react with the calcium compounds in the concrete until all bubbling of the surface stops. The calcium compounds neutralize the acid forming calcium chloride, which is washed away with clean water. Scrubbing the concrete surface with a broom while rinsing will ensure removal of all laitances. Allow the concrete to dry thoroughly prior to continuing the surface preparation.

Primer selection – The Coating Holdings Cold Bond Cement has proven successful for bonding urethane and rubber to concrete.

The primer is also suitable for concrete bonding especially for hard or normal troweled surfaces.

URETHANE/RUBBER:

New urethane / rubber nuts are washed with solvent to remove any waxes, release agents etc. prior to preparation.

The best surface preparation for rubber or urethane is either slow speed sanding (2000 RPM or less) with a 24, 36 or 50 grit aluminum oxide sanding disc or a rotating stiff bristled wire brush, 75, to 100mm (3" to 4") in diameter x25mm (1") face attached to an electric drill or air motor of approximately 1400 RPM.

The key is to roughen the surface without "burning" or "charring" the substrate. Roughening means cutting or abrading the surface creating a rough texture on the rubber or urethane, which you can visually confirm.

Remove all loose sanding dust and solvent. Solvent wipes the surface. Begin the application of primer,

Primer Selection - provides excellent adhesion to urethane and rubber substrates.

FIBREGLASS:

A successful procedure for preparing fiberglass has been to abrade the surface in the same manner as Urethane/Rubber.

For large areas, sandblasting with a medium-fine blast media can provide satisfactory surface preparation. It is well advised to test adhesion of blasted fiberglass prior to coating.

Primer Selection – Both of the primers have proven successful as primers for properly prepared fiberglass.

WOOD:

New wood should be free from all oils, greases, tars or pitch. Remove with mineral spirits or other types of recommended solvents. Rough spots should be sanded and dust removed. Fill cracks and holes with appropriate wood putty and sand flush with the existing surface.

Primer Selection – As wood is porous substrate priming is not necessary. However, a single coat of either the will act as a barrier coat to moisture and air pockets.

TECHNICAL SERVICE:

Other substrates of metals or non-metals can be coated with Coating Holdings Urethane Coatings. Contact our office for more specific information on substrates not listed or any other question you may have regarding surface preparation.



Repeated Food Contact Use

Coating Holdings LTD ORWPM, tested and passed, is a spray able urethane compound that complies for use under the FFDCA and all applicable food additive regulations as a repeated food contact surface and for potable (drinking) water applications under polyurethane resin category CA#373833-28-1 derived from a reaction of MDI (Diphenylmethane Diisocyanate) with 1,4-butanediol and polytetramethylene ether glycol.

The intended use for Coating Holdings, LTD ORWPM falls under FDA Regulations 21 CFR Sec. 175.300, Table 2 Part E-“Room temperature filled and stored (no thermal treatment in container), including the following applications under Table 1:

- I. **Nonacid (pH above 5.0), aqueous products;** may contain salt or sugar or both, and including oil-in-water emulsions of low or high fat content.
- II. **Acidic (pH 5.0 or below), aqueous products;** may contain salt or sugar or both, and including oil-in-water emulsions of low or high fat content.
- III. **Aqueous, acid or nonacid products containing free oil or fat;** may contain salt, and including water-in-oil emulsions of low or high-fat content.
- IV. **Dairy products and modifications:**
 - A. Water-in-oil emulsion, high or low-fat.
 - B. Oil-in-water emulsion, high or low-fat.
- V. **Low moisture fats and oils.**
- VI. **Beverages:**
 - A. Containing alcohol.
 - B. Nonalcoholic
- VII. **Bakery Products.**

For further information please contact Coating Holdings LTD.
08/08

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Coating Holdings LTD

August 5, 2008