



ENGARD 428 H.S. CHEMICAL RESISTANT URETHANE

ENGARD 428 H.S. Chemical Resistant Urethane is an aliphatic polyester urethane protective finish. This class finish is intended for use in both field and shop operations to provide an attractive high gloss and color retentive appearance for exposed surfaces that are in contact with extremely corrosive environments. It is designed to provide a dry film thickness of up to 5 mils per applied coat. ENGARD 428 H.S. Chemical Resistant Urethane features exceptional ease of application, toughness, flexibility, abrasion and chemical resistance. It may be used in combination with primers such as ENGARD 460 Chemical Resistant Primer and with coatings such as ENGARD 480 H.S. Epoxy Coating.

STANDARD DATA

COLORS:	Various	APPLICATION METHODS:	Airless or Conventional Spray, Brush (small areas)
FINISH:	High Gloss		
VOLUME SOLIDS:	64%	DRY TIME @ 70F:	Recoat - 12 Hours Final Cure - 5 Days (See Suggested Application Procedures, Section 9.)
WEIGHT SOLIDS:	74%-75%		
VOC CONTENT:	Less than 340 gms/l (2.83 lbs/gal)	COVERAGE:	Dry film spreading rate per gallon:
COMPONENTS:	Two		
POT LIFE @ 70F:	2 Hours	Theoretical (no loss)	1030 sqft @ 1 mil 343 sqft @ 3 mils 206 sqft @ 5 mils
THINNER:	ENGARD 38	Practical (20% loss)	824 sqft @ 1 mil 275 sqft @ 3 mils 165 sqft @ 5 mils
THINNER RATIO:	Thin only if required for proper application.	MIXING RATIO:	Mix complete pre-measured packaged kits. By volume 1 part Component A to 4 parts Component B.
SHELF LIFE @ 70F:	One year from date of shipment.		
DOT/FLASH POINT CLASSIFICATION:	Flammable liquid		

USAGE

ENGARD 428 H.S. Chemical Resistant Urethane may be considered as a protective finish which must be decorative as well as resistant to highly corrosive chemical and physical conditions. ENGARD 428 H.S. is suggested for storage tanks, railcars, tank trucks, mechanical equipment, sewage plants, refineries, off-shore drilling platforms, marine service, pulp and paper industry, mining and chemical plants. The principal use for ENGARD 428 H.S. Chemical Resistant Urethane is in problem areas which require a high gloss finish that is tough and chemical resistant or has low temperature flexibility and impact properties.

SERVICE LIMITATIONS

Atmospheric temperature resistance up to 250F depending upon the individual environment. For exposure to corrosive chemicals and elevated temperatures, CONTACT ENGARD FOR SPECIFIC RECOMMENDATIONS AND INSTRUCTIONS BEFORE PROCEEDING.

ORDERING AND STORAGE

NOTE: Chemical and physical resistance, color and gloss retention, solids content and application properties may be affected by or vary according to color and gloss level selected. Color and gloss variation may occur due to different induction and heat/dry time cure cycles used or if subject to moisture before curing is completed. Color and gloss retention may be affected (yellowing, darkening and/or flattening) by exposure to elevated temperatures. Certain colors may require a white base coat be applied prior to finish coating and/or may require multiple applications in order to achieve satisfactory hiding and uniformity of appearance. All whites and pastel colors are manufactured using chalk resistant titanium dioxide (rutile grade) unless designated or requested specifically otherwise. When ordering or computing working coverage, allow for application loss and surface irregularities. Multiple coats may be necessary to achieve the desired film thickness due to variations in design configuration, application equipment, temperature and other factors. Store in a protected area between 40F and 100F. Material should not be used if storage conditions or suggested shelf life have been exceeded unless found to be satisfactory after reinspection by ENGARD.

SUGGESTED SURFACE PREPARATION

No more surface preparation should be performed than can be properly coated. Round off all sharp edges and rough welds. All burrs and weld spatter should be completely removed. Concrete and masonry should cure at least thirty (30) days and have a moisture content prior to coating below 8% as measured by an instrument such as a Delmhorst Model DP. Oil, grease and heavy deposits of surface contaminants should be removed by use of ENGARD 9 Solvent Degreaser or ENGARD 7 Surface Cleaner. All surfaces must be clean, dry and free of any dirt, dust, chalk, grease, oils, salts, curing compounds, release agents, preservatives and other deleterious materials before application is performed. **NOTE:** Vacuuming the topside of all horizontal and sloped surfaces is recommended.

CARBON STEEL: It is recommended for severe atmospheric exposures that metal surfaces be prepared in accordance with SSPC-SP10 (Near-White Blast Cleaning). For mild exposures metal surfaces may be prepared in accordance with SSPC-SP6 (Commercial Blast Cleaning). Prepared metal surfaces should have an anchor profile of not less than two mils (.002) as measured by use of a non-destructive instrument such as a Keane-Tator Surface Profile Comparator. Apply a first application coat of a suitable ENGARD primer or coating in accordance with ENGARD's instructions before applying this product.

ALLOY STEELS AND NON-FERROUS METALS: Chemically clean surfaces in accordance with SSPC-SP1 (Solvent Cleaning). Abrasive "brush" blast to provide a lightly profiled and etched surface. Apply ENGARD 135 Pretreatment Primer to a dry film thickness of not more than one-half mil (.0005) or apply ENGARD 1 Metal Conditioner in accordance with ENGARD's instructions depending upon the service environment. **NOTE:** Coatings applied to these surfaces may not achieve the same degree of adhesion and toughness.

WELDING: Welding should precede coating. In the event welding or flame cutting is performed on metal already coated with this product, do so in accordance with the latest instructions in U.S.A. Standard Z49:1 "Safety in Welding and Cutting". All welded, burned or otherwise damaged areas should be cleaned to base metal, prepared and recoated as specified.

CONCRETE AND MASONRY: Clean surface by abrasive "brush-off" blast or etch with 10% hydrochloric acid. If etching is employed, the acid solution should be applied at a spreading rate of 1.5 pints per square yard to obtain total wetting of the substrate, and thoroughly worked into the surface by stiff bristled brushes until the bubbling reaction has subsided. **PROTECTIVE CLOTHING AND EQUIPMENT SHOULD BE USED WHENEVER WORKING WITH ACIDS!** The etched surface should then be thoroughly washed and scrubbed with clean water and stiff bristled brushes and/or high pressure water hosing to remove all salts and loose particles. Surface and substrate must be thoroughly dry before proceeding with any coating application. Repair and trowel smooth all cavities and voids with ENGARD 490 Epoxy Putty. Clean silica may be added to ENGARD 490 Epoxy Putty to fill large cavities and voids. Apply a first application coat of a suitable ENGARD primer or coating in accordance with ENGARD's instructions to completely wet and thoroughly penetrate the surface before applying this product.

ZINC PRIMED AND PREVIOUSLY COATED SURFACES, POROUS SUBSTRATES, PLASTICS AND MISCELLANEOUS MATERIALS: Contact ENGARD for specific recommendations and instructions before proceeding. **NOTE: Coatings applied to these surfaces may require a special tie coat or barrier primer.** Always check compatibility before application over a previous coated area.

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NOTE: Different ENGARD coatings and/or surface preparation procedures may also be completely satisfactory for use with this product. If, for any reason, additional information, instructions or explanations are needed, refer to the appropriate supplemental technical bulletins and manuals or contact ENGARD before proceeding.

SUGGESTED APPLICATION PROCEDURE

1. Completely read the Product Technical Bulletin and Material Safety Data Sheet before proceeding.
2. This product is moisture sensitive until cured and will be adversely affected by water contamination. Keep containers dry and tightly sealed at all times.
3. Flush all equipment clean with ENGARD 38 Thinner.
4. Add the total contents of Component A (Activator) into Component B (Base). Do not vary these proportions. Power stir thoroughly until completely mixed and continue agitation during application. **EMPTIED CONTAINERS ARE HAZARDOUS BECAUSE THEY RETAIN PRODUCT VAPOR AND RESIDUE.** Properly destroy and dispose of containers after use.
5. Thin only if required for proper application with ENGARD 38 Thinner. Do not exceed applicable volatile organic compound (VOC) regulations.

THINNING CALCULATION EXAMPLES

VOLUME 38 THINNER	GMS/LITER VOC CONTENT	LBS/GAL VOC CONTENT
0%	272	2.27
5%	300	2.50
10%	325	2.71
15%	348	2.90
20%	370	3.08
25%	389	3.24
30%	407	3.39
40%	439	3.66
50%	467	3.89

6. Strain only if required for proper application. Apply in an even wet coat. Give particular attention to all seams and other irregularities to insure that they are completely covered. Application below minimum or above maximum suggested dry film thickness range may adversely affect performance.

7. Pot life of a mixed one gallon kit is approximately 2 hours @ 70F. Pot life is significantly shorter at higher temperatures or in larger quantities and longer at lower temperatures or in smaller quantities. **CAUTION! Do not allow catalyzed material to stand in equipment after use!** Clean immediately with ENGARD 38 Thinner.

8. Application at air and surface temperatures lower than 125F and above 40F and more than 5F above the dew point is suggested. If it is necessary to apply this product at temperatures or humidities beyond these preferred limits, contact ENGARD for additional information, instructions and explanations before proceeding.

9. Recoat when material is relatively dry and firm, but before coating reaches complete cure and hardness. Curing times are significantly shorter at higher temperatures or lower thickness and longer at lower temperatures or higher thickness. Suggested severe exposure recoat guide for 3 mils of this product at 70F and 50% relative humidity is 12 hours.

There are additional factors which can influence the drying rate such as: the method of application; the quantity of thinner added, if any; the amount of air circulation and ventilation; humidity variations, etc. Allow final dry time of at least 5 days at 70F before placing in operating service. Heat curing may be used to increase drying speed and resistance properties. If desired, after the final coat has been applied, allow solvents to evaporate before gradually raising the temperature until the substrate reaches 150F for a period of 2 hours. **NOTE:** Contact ENGARD for different heat cure time cycles.

10. If it is necessary to spot repair or topcoat with the same product after this material has reached complete cure and hardness, the following preparation is suggested: Properly clean the areas, then uniformly abrade the surface and feather the edges by hand or power sanding or abrasive "brush" blasting under low pressure. The surface must be roughened sufficiently to provide a profile adequate to insure a mechanical bond. Also, the use of ENGARD 2 Tie Solvent may be desired.

11. If it is necessary to apply this product directly on a rough/porous type primer or substrate, the use of a thin or "mist" coat prior to the regular application may be needed to reduce the possibility of pinholing and/or blistering.

12. Check for desired dry film thickness. Use a non-destructive instrument such as a Mikrotest on ferro-magnetic substrates and an Elcometer "Eddy-Current" Tester on non-ferrous metallic substrates. Use an instrument such as a Tooke Gage on non-metallic substrates when a destructive tester is necessary.

13. On surfaces subject to severe environments, check for pinholes, holidays and bare areas. Use a non-destructive detector such as a Tinker & Razor M-1 on conductive substrates.

14. If the coating is to be subjected to contact with either food or potable water or to protect the purity of stored products, disinfect or decontaminate the fully-cured-coated surface by thoroughly flushing clean with 50 ppm chlorine water solution. Rinse with fresh water and drain to waste. All solvent vapors must be completely removed before placing in operating service.

15. All coatings to be applied in accordance with the latest revisions of Steel Structures Painting Council, and American Concrete Institute surface preparation and application specifications. If, for any reason, additional information, instructions or explanations are needed, refer to the appropriate supplemental technical bulletins and manuals or contact ENGARD before proceeding.

SUGGESTED APPLICATION EQUIPMENT

AIRLESS SPRAY*: Standard equipment such as Graco or equal using a 30:1 or higher pump ratio. Graco 206-718 gun having a fluid tip of .017" or larger orifice size with Reverse-A-Clean tip, 3/8" I.D. or larger high pressure and solvent resistant fluid line, 1/2" I.D. or larger air supply line. Operating air source capable of providing 80 to 100 psi inbound pressure at the pump.

CONVENTIONAL SPRAY*: Standard equipment such as Binks or equal using a pressure material pot with mechanical agitator, equipped with dual regulators and air gages. Oil and moisture separators are necessary. Binks No. 18 gun (external mix), 67 fluid nozzle, 65 fluid needle, 67 PB air cap, heavy duty fluid spring and Teflon fluid packing, 1/2" I.D. or larger high solvent resistant fluid line and 3/8" I.D. or larger air supply line. Operating air source capable of providing a minimum of 20 cfm at 80 psi to each nozzle and 60 psi to the pot is required.

*Regulate pressure as required for proper application. Adjust pressure proportionally higher for the smaller hose diameter and/or longer hose length and proportionally lower for the larger hose diameter and/or the shorter hose length. Tip angles and orifice diameters should be selected according to application conditions.

BRUSH: Short hair or natural bristle brushes only.

CLOTHING: Wear protective garments, goggles and filter masks. Protective barrier creams should be used on any exposed areas of skin.

RESPIRATOR: A respirator that is recommended or approved for use in isocyanate containing environments (air purifying or fresh air supplied) may be necessary. Consider type of application and environmental concentrations. Observe OSHA regulations for respirator use (29 CFR 1910.134). In spray applications, when the airborne isocyanate monomer concentrations are known to be below 0.05 ppm and if the polyisocyanate (polymeric, oligomer) concentrations are known to be below 10mg/m³, a properly fitted air-purifying (combination organic vapor and particulate) respirator, proven by test to be effective in isocyanate containing spray paint environments, will provide sufficient protection. When the airborne isocyanate concentrations are not known, or if either of the above guidelines is exceeded, or if spraying is performed in a confined space or area with limited ventilation, the use of a positive pressure supplied air respirator is mandatory.

Even during non-spray operations such a mixing, brush or roller application, etc., depending on the conditions (for example, heating of material or application to a hot substrate), it is possible to be exposed to airborne isocyanate vapors. Therefore, when airborne concentrations during such non-spray operations exceed the suggested TLV of 0.005 ppm for isocyanate monomer, but are below 0.05 ppm, at least an air purifying (organic vapor) respirator is required. If airborne concentrations are unknown, or exceed 0.05 ppm, or operations are performed in a confined space, a supplied air respirator must be worn.

IN CONFINED AREAS AND TANKS - READ THIS NOTICE! Use explosion-proof lighting and electrical equipment, non-sparking tools, clothes and shoes. Ground all structures and equipment. Use procedures which prevent static electrical sparks. Wear properly fitted appropriate NIOSH/MSHA approved fresh air respirator such as MSA or equal with 1/4" I.D. or larger air supply line connected directly to proper air source during and after application unless air monitoring demonstrates vapor/mist levels are within safe limits. Use suction type exhaust fans and blowers with sufficient cfm capacity to keep solvent vapors below 20% of the explosive limit. **NOTE:** Air circulation and exhausting of solvent vapors must be continued until the coatings have fully cured to insure that no potential for fire, explosion or health hazard remains.

NOTE: All equipment and procedures are to conform to the latest safety requirements of applicable regulatory agencies. Follow equipment manufacturer's directions and instructions on all equipment used. Different equipment combinations and equivalent equipment form other manufacturers may be completely satisfactory for use with this product. If, for any reason, additional information, instructions or explanations are needed, refer to the appropriate supplemental technical bulletins and manuals or contact ENGARD before proceeding.

HAZARD WARNING - READ THIS NOTICE!

THIS PRODUCT CONTAINS KETONES, PETROLEUM DISTILLATES, ESTERS, ALIPHATIC POLYISOCYANATE AND POLYESTER RESINS. DO NOT USE IF YOU HAVE HAD A REACTION TO THESE MATERIALS.

WARNING! COMBUSTIBLE! VAPOR HARMFUL! CAUSES SEVERE EYE AND SKIN BURNS. MAY CAUSE LUNG IRRITATION AND ALLERGIC RESPIRATORY REACTION! HARMFUL OR FATAL IF SWALLOWED!



Keep away from heat, sparks and open flame. Use only with adequate ventilation. Prevent breathing of vapor or spray mists. Wear an appropriate, properly fitted respirator during application and until all vapors and spray mists are gone. **DO NOT USE IF YOU HAVE CHRONIC LUNG OR BREATHING PROBLEMS.** Prevent contact with eyes and skin. Do not take internally. Keep closures tight and upright to prevent leakage. Keep container closed when not in use. In case of spillage, absorb and dispose of in accordance with local applicable regulations. **FIRST AID:** In case of skin contact, wash thoroughly with soap and water; for eyes, flush immediately with plenty of water for 15 minutes and call a physician. Remove and wash contaminated clothing before reuse. (Discard contaminated shoes). If inhaled, remove to fresh air. If breathing difficulty persists or occurs later, consult a physician and have label and MSDS information available. If swallowed, **CALL A PHYSICIAN IMMEDIATELY.** **DO NOT** induce vomiting.

IN CONFINED AREAS AND TANKS OBEY SPECIAL SAFETY AND EQUIPMENT INSTRUCTIONS!

FOR INDUSTRIAL USE BY PROFESSIONAL APPLICATORS ONLY. NOT INTENDED FOR SALE TO THE GENERAL PUBLIC. Not to be sold or delivered to any person under 18 years of age. **KEEP OUT OF THE REACH OF CHILDREN!** If, for any reason, additional product and safety information, instructions or explanations are needed, **CONTACT ENGARD IMMEDIATELY!**

LIMITED WARRANTY - READ THIS NOTICE!

ENGARD's technical advice, recommendations and services are provided without charge and are carefully based on the most accurate and reliable information we have obtained. All technical information, test results, instructions and suggested recommendations are predicated on storage, application and service performance conditions at an ambient temperature of 70F and 50% relative humidity unless designated specifically otherwise in writing. We fully warrant and guarantee the uniformity of our products within manufacturing tolerance. However, since the use of ENGARD's products, their application, the regulation of the service environment, their maintenance and routine repair, etc. are factors beyond its direct control, its products are furnished only upon the condition that the customer shall make his own determination of the suitability of ENGARD's products for his particular purpose, and ENGARD disclaims all responsibility for results obtained or any damages incurred from their use. THEREFORE, IN THE EVENT THAT THERE ARE ANY DAMAGES WHICH ARISE OUT OF ENGARD'S NEGLIGENCE OR BREACH OF WARRANTY, WE WILL SUPPLY, AT ENGARD'S OPTION, EITHER SUFFICIENT MATERIAL FREE OF CHARGE TO REPLACE ANY DEFECTIVE PRODUCTS OR REFUND OF THEIR PURCHASE PRICE FOR A ONE YEAR PERIOD FROM DATE OF PURCHASE. Failure to give written notice of claim within one year from date of delivery shall constitute a waiver of all claims in respect to such products. **THERE ARE NO OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WHICH ARE NOT STATED HEREIN!**