

## UV/Visible Light/LED Curable Multi-Substrate Medical Bonder/Sealant

### PRODUCT DESCRIPTION

Incure Cyro-Weld™ 5302 is a low viscosity UV/Visible Light/LED curable, acid-free form-in-place/cure-in-place (FIGP/CIPG) gasket and sealant for medical devices. Cures on demand and tack-free, it is 100% solids and does not contain any volatiles. Ideal for optical positioning/alignment with excellent passive vibration resistance capability, it bonds well to many different substrates such as glass, metals, ceramics and plastics such as Pebax. Incure 5302 exhibits good thermal and moisture resistance, making it a desired choice for bonding, sealing and gasketing applications. Formulated to meet ISO 10993-5.

### UNCURED PROPERTIES

Chemical Type	Urethane Acrylate, 100% Solids, No Solvents			
Appearance	Single Component, Clear Transparent			
Density, g/ml	1.06	Refractive Index	1.49	@20°C
Flash Point, °C	> 93	Toxicity	Low (Refer to MSDS)	
Viscosity, cP	200 - 500 @20rpm	Spindle	2	
Other viscosities are available upon request. If the viscosity range requested is not our standard offering, this product may be produced with a small lab fee.				ASTM D2556
Email us at: support@uv-incure.com or your nearest local distributor for more information.				

<sup>1</sup> Viscosity (cP) taken at 25°C - Call to enquiry for other viscosities.

### CURED PROPERTIES

Shore Hardness, Durometer	D15 to D25	ASTM 2240
Linear Shrinkage / Expansion (-ve)	0.60%	ASTM D2566
Water Absorption at 24hrs	0.70%	<sup>2</sup> ISTM D570
Tensile (PSI)	PC-PC / PC-SS PC-S / PC-AL	3,100 / 3,800 3,600 / 3,100
Surface After Full Cure	Tack-Free	<sup>2</sup> ISTM D189
Elongation at Break	832%	ASTM 638
Thermal Range (Brittleness / Degrades) °C	-55 to 150	<sup>2</sup> ISTM D366
Young's Modulus of Elasticity, MPa (PSI)	1,260 (182,800)	<sup>3</sup> ASTM 638
Linear CTE (α1 & α2), ppm/°C	α1=47, α2=60	<sup>2</sup> ISTM D696

<sup>2</sup> ISTM - refers to Incure Standard Test Method.

<sup>3</sup> ASTM 638 Young's Modulus test speed @5mm/min for rigid and semi-rigid materials, @50mm/min for non-rigid materials, unless otherwise specified.

### RECOMMENDED UV CURE SCHEDULE (FULL CURE)

Full Cure Exposure Time		UVA	UVB	UVC	UVV
Fixture Time between glass slides	mW/cm <sup>2</sup>	223	56	4	215
Exposure Time (s)	2.0	mJ/cm <sup>2</sup>	446	112	8
F200P™ @3.75" Dist	5.0	mW/cm <sup>2</sup>	223	56	4
Belt Speed (ft/min)	12.0	mJ/cm <sup>2</sup>	1,115	280	19
F500™ @3.0" Dist	3.0	mW/cm <sup>2</sup>	436	127	12
Belt Speed (ft/min)	8.0	mJ/cm <sup>2</sup>	1,308	381	35
S20™ Spot (4-Pole LG) 0.4" Dist	mW/cm <sup>2</sup>	3,000	530	50	3,400
Exposure Time (s)	1.0	mJ/cm <sup>2</sup>	3,000	530	50
L9000™ LED Spot @ 0.67" Dist	mW/cm <sup>2</sup>	2,800	42	12	102
Exposure Time (s)	3.0	mJ/cm <sup>2</sup>	8,400	126	36

Cure times on 8mm Ø adhesive sample. Belt speeds using C9000-F200Px1AB (Flood) and C9000-F500x1AC (Focused Beam) conveyors for area curing. Please consult IncureLab™ for any other requirements.

### UV INTENSITY REFERENCE TABLE

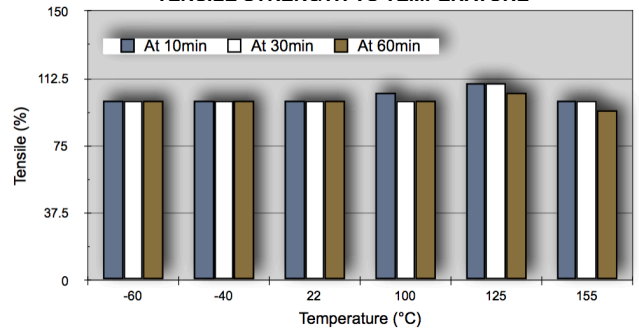
Incure UV Curing Lamp Model	Curing Distance vs UV Intensity					
	0.5" (12.6)	1" (25.4)	1.5" (38)	2" (50.8)	2.5" (63.5)	3" (76.2)
S20™ ARC (mW/cm <sup>2</sup> ) / (Ø mm)	1,400 (3)	1,500 (4)	650 (6)	360 (8)	240 (10)	175 (12)
L9000™ LED (mW/cm <sup>2</sup> ) / (Ø mm)	7,500 (9)	5,000 (10)	2,300 (17)	1,200 (20)	700 (25)	450 (30)
Flood/Focus Beam (Area)	UV Intensity (mW/cm <sup>2</sup> )					
F200™ ARC Flood (6" x 8")	325	280	245	215	190	165
F400™ ARC Flood (4" x 4")	860	570	440	345	270	215
F500™ ARC Focused (3" x 5")	1,040	685	530	415	325	260
L1044-365™ LED Flood (4" x 4")	2,675	2,380	1,900	1,625	1,430	1,280
L1044-405™ LED Flood (4" x 4")	2,950	2,625	2,150	1,900	1,650	1,450

<sup>4</sup> Curing Distance is defined by the tip of light-guide or base of lamp housing to the bond area. All values are nominal with ±10% variation, with LED Flood Static Uniformity at ±78% and Dynamic Uniformity at ±90%. Recommended curing parameters in grey.

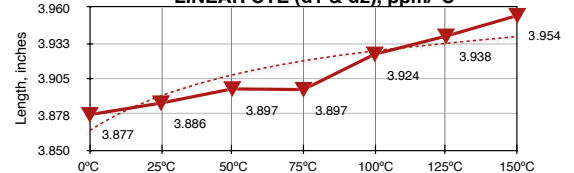
### UV CURING SCHEDULE FOR THIS PRODUCT

Wavelength λ	UVA (320 - 400nm)	UVB (290-320nm)	UVC (290-220nm)	VUV (400-700nm)
Minimum Intensity	223 mW/cm <sup>2</sup>	56 mW/cm <sup>2</sup>	4 mW/cm <sup>2</sup>	215 mW/cm <sup>2</sup>
Total Energy Required	1,115 mJ/cm <sup>2</sup>	280 mJ/cm <sup>2</sup>	19 mJ/cm <sup>2</sup>	1,075 mJ/cm <sup>2</sup>

### TENSILE STRENGTH VS TEMPERATURE



### LINEAR CTE (α1 & α2), ppm/°C



### SECONDARY HEAT CURE (Not Applicable)

Continuous Oven Bake	Duration
95°C (203°F)	120 mins
110°C (230°F)	60 mins
125°C (257°F)	30 mins

Note: This product has been thoroughly tested to cure with F200P™ UV Flood Lamp. Intensity wavelengths (shaded) are crucial for curing this product. All measurements are made with EIT UV PowerPuck II. If you are unable to fully cure this product for some reasons, pls email us for assistance with your curing information.

### SHELF-LIFE, STORAGE, USE AND HANDLING OF THIS PRODUCT

Shelf-Life of this unopened product is a minimum of ONE (1) year from date of manufacture. Avoid direct exposure of bottle to visible light at all times. Containers should remain covered when not in use. Product should be stored in a dark cool place of 10°C to 32°C. Transfer of product into other packages void all warranties. Users should ensure all bonding surfaces are free of grease, mold release, or any contaminants, as bonding performance will be compromised. All tests for cured bonds should be carried out at ambient temperature. For safe handling of this product, please read Material Safety Data-sheet (MSDS) prior to use. Organic solvents, such as IPA, may be used to wipe away uncured material from surfaces.

### Eto and GAMMA STERILIZATION

All Incure medical products are formulated to subject to standard sterilization methods, such as EtO and Gamma Radiation of 25 to 50 kGrays (cumulative). Enhanced moisture and thermal resistance of this product show excellent adhesion and bonding strength after one cycle of steam auto-clave test. Depending on bond design and structure of the application, users should test specific assemblies after subjecting them to sterilisation. Consult Incure Support Team for assistance, if your devices are subjected to more than one sterilization cycles.

### NOTE

The data contained in this document are furnished for information only. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein. INCURE will not be liable for any indirect, special, incidental or consequential loss or damage arising from this INCURE product, regardless of the legal theory asserted. INCURE recommends that each user adequately test its proposed use and application before repetitive use, using this data as a guide.

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# Material Safety Data Sheet (MSDS)

Released On: Mar 29, 2016


Version: 5302-05

**incure**<sup>TM</sup>  
ADHESIVES, EPOXIES AND COATINGS

## Section 1 - Product and Company Identification

<b>Product Name</b> <b>Technical Data</b> <b>Sheet</b>	<b>Product Code</b> <b>5302</b>	DECLARATION: The information furnished here is to the best of our knowledge. INCURE Incorporation does not assume any liability whatsoever for the accuracy or completeness of information contained herein. Final determination of suitability of any material is the sole responsibility of the end-user. All materials may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exists.
Company / Supplier Name	Incure Inc. 1 Hartford Square, Box 16 West, Suite C-3 West Gate, Door 18, New Britain, CT 06052, USA	Incure Adhesives Manufacturing Pte Ltd 33 Ubi Avenue 3 #04-23, Vertex Tower B Singapore 408868
Emergency Contact Information:	Tel: (860) 748-2979	Tel: (65) 62702188
Product Category	Urethane Acrylate, 100% Solids, No Solvents	

## Section 2 - Hazards Identification

GHS Pictogram		
Signal Word	GHS07 Warning	
GHS Hazard Phrases:	H315	Causes skin irritation.
	H317	May cause an allergic skin reaction.
	H319	Causes serious eye irritation.
	H335	May cause respiratory irritation.
	H412	Harmful to aquatic life with long lasting effects.
GHS Precautionary Phrases:	P271	Use in a well-ventilated area.
	P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
	P102	Keep out of reach of children.
	P262	Do not get in eyes, on skin or on clothing.
GHS Response Phrases:	P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
	P333+P313	If skin irritation or rash occurs: Get medical advice/ attention.
	P234	Keep only in original container.
GHS Storage and Disposal Phrases:	P501	Dispose of contents/ container in accordance with local regulations.
GHS Classification:	Physical and Chemical Hazards	Not Classified.
	Human Health	H315, H317, H319, H335
	Environment	H412

## Section 3 - Material Composition / Safety Data on Product

CAS No.	% Composition	Description	GHS Classification
Proprietary	20 - 40	Specialty Urethane Acrylate Oligomer Blend	H315, H319, H335
5888-33-5	15 - 25	Isobornyl Acrylate	H315, H319, H335
868-77-9	0 - 5	2-Hydroxyethyl Methacrylate	H315, H319, H335
79-10-7	N.A.	Acrylic Acid	H226, H302, H313, H314, H315, H319, H332, H335, H400
Proprietary	1 - 5	Photo-Initiator	H315, H319, H335
2680-03-7	0 - 5	N,N-Dimethylacrylamide	H315, H319, H335
2235-00-9	0 - 5	1-Vinylhexahydro-2H-Azepin-2-one	H315, H319, H335
Proprietary	15 - 30	Specialty Urethane Acrylate Oligomer Blend	H315, H319, H335
Proprietary	15 - 30	Specialty Co-Monomer Blend	H315, H319, H335
7631-86-9	None	Silicon Dioxide	H315, H319, H335

## Section 4 - First-Aid Measures

After Inhalation:	Provide ample fresh air. Provide artificial respiration, give oxygen if experience difficulties in breathing. Consult doctor if symptoms persists.
After eye contact:	Rinse eye for up to 15 minutes under running water. If symptoms persists, consult an eye doctor.
After skin contact:	Immediately wash with water and soap thoroughly. Remove contaminated clothings.
After Swallowing:	Seek medical attention and treatment.

## Section 5 - Fire-Fighting Measures

Suitable Extinguishing Agents	Water spray, dry chemical or carbon dioxide will be useful. Fight larger fires with water spray or alcohol resistant foam.
Protective Equipment	Mouth respiratory protective device (face mask) is necessary in the event of fire.
Unusual fire or Explosion Hazards	Uncontrolled polymerization may occur at high temperatures due to explosions or rupture. Toxic fumes and irritating organic vapors may be present.

## Section 6 - Accidental Release Measures

Person-related Safety Precautions	Not Required
Measures for environmental protection:	Inform respective authority in case of seepage into water course or sewage system. Do not allow to enter sewers or waterways.
Measures for cleaning / collecting:	Soak up with absorbent inert materials (sand, silica gel, sawdust). Dike area to prevent spreading. Dispose of as a chemical waste in accordance with current local, state and federal regulations. Please refer to Section 8 prior to clean-up.

## Section 7 - Handling and Storage

Handling:		Storage:	
Information for safe handling at workplace	Keep away from heat and direct sunlight. Use product with good ventilation/exhaust.	Requirements to be met by storerooms	Avoid exposure to sunlight.
Information about protection against explosions and fire	No special measures required	Information about storage in one common storage facility	Not required. Keep bottle cap / receptacle tightly sealed.
		Maximum Storage Temperature	< 35°C (95°F)

## Section 8 - Exposure Controls and Personal Protection

Additional information about design of technical systems	No additional data, please refer to Section 7
Components with limit values that require monitoring	Product does not contain any relevant quantities of materials with critical values needing monitoring at workplace
Additional information	N.A.
General protective and hygienic measures	Keep away from foodstuffs, beverages such as drinking water. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with eyes and skin.
Breathing equipment	Use respiratory filter device in case of brief exposure resulting in discomfort. For prolonged exposure, use respiratory protective device that is independent of circulating air.

# Material Safety Data Sheet (MSDS)

Released On: Mar 29, 2016 (05)  
Reprinted On: Jul 16, 2019



Protection of hands Use protective impermeable gloves that are resistant to the product. Selection of glove material should consider penetration times, rates of diffusion and degradation.  
Protection of eyes Use tightly sealed goggles for best protection in a poorly ventilated area.

## Section 9 - Physical and Chemical Properties

Form / Color / Odor	Fluid / According to Technical Data Sheet / Characteristics	Flash Point	> 93°C (200°F)
Change in condition beyond melting point	Undetermined	Auto-Igniting	Does not self-ignite
Change in condition beyond boiling point	115°C (240°F)	Danger of Explosion	None

## Section 10 - Stability and Reactivity

Thermal decomposition / conditions to be avoided No decomposition if used according to specification  
Incompatible materials Strong oxidizing and reducing agents. Strong acids and bases. Free radical initiators.  
Dangerous reactions None  
Dangerous products of decompositions Some Oxides of following chemicals may be formed - Carbon, Nitrogen, Silicon, Phosphorous, Amines.  
Additional Information Smoke and toxic fumes may evolve as a result of uncontrolled exothermic chemical reactions caused by large masses of materials interacting with curing agents (peroxides, amines, etc) and / or exposure to UV light / sunlight.

## Section 11 - Toxicological Information

Acute Toxicity - LD/LC50 values that are relevant for classification	Oral LD50	Dermal LD50	Inhalative LD50/4hr
5888-33-5 Isobornyl acrylate	-	> 5000 mg/kg (rabbit)	-
24650-42-8 Photo-initiator	>2000 mg/kg (rat)	>2000 mg/kg (rat)	-

Primary irritant effect on skin/eye Irritant to skin and mucous and membranes. Danger of severe eye injury.  
Additional toxicological information Product shows following dangers according to internally approved calculation methods of preparations: Harmful, Irritant.

## Section 12 - Ecological Information

Ecotoxicological Effects: Aquatic Toxicity 24650-42-8 Photo-Initiator - EC50/48hr 26mg/L (daphnia)  
5888-33-5 Isobornyl acrylate - EC50/48hr 0.9mg/L (daphnia)  
Remarks Toxic for aquatic organisms  
General Notes: Water hazard class 3 (self-assessment) - extremely hazardous for water. Do not allow product to reach ground water, water course or sewage system, even in small quantities. Danger to drinking water if even extremely small quantities leak into the ground. Also poisonous for fish and plankton in water bodies.

## Section 13 - Disposal Considerations

Disposal of Product Must not be disposed with household garbage and do not allow product to reach sewage system.  
Disposal of Uncleaned Packagings Disposal must be made according to official regulations

## Section 14 - Transport Information

DOT Regulations: - Hazard Class: -

Land Transport ADR/RID (cross-border)		Air Transport ICAO-TI and IATA-DGR		Maritime Transport IMDG	
ADR/RID Class	Not Restricted	ICAO/IATA Class	Not Restricted	IMDG Class	Not Restricted
Danger Code		Label		Label	
UN Number		UN Number		UN Number	
Packaging Group		Packaging Group		Packaging Group	
Label		Label		Label	
Description of Goods		Description of Goods		Marine Pollutant	

## Section 15 - Regulatory Information

Section 355 (Extremely hazardous substances) None  
Section 313 (Specific toxic chemical listings) Acrylic Acid (79-10-7)  
TSCA (Toxic Substances Control Act) All ingredients are listed  
California Proposition 65 No California Proposition 65 listed chemicals are known to be present.  
Chemicals known to cause reproductive toxicity for females None  
Chemicals known to cause reproductive toxicity for males None  
Chemicals known to cause developmental toxicity None  
Cancerogeny Categories EPA - None , IARC - Acrylic Acid , NTP - None , TLV - Acrylic Acid , NIOSH-Ca - None , OSHA-Ca - None  
Product related hazard information Product has been classified and marked in accordance with directives on hazardous materials  
Hazard Symbol Harmful - Dangerous for the environment  
Hazard-determining components of labelling None  
Risk phrases Harmful by inhalation. Irritating to eyes, respiratory system and skin. Toxic to aquatic organisms.  
Safety phrases Keep container in a well-ventilated place. Do not breathe gas/fumes/vapor/spray. In cases of contact with eyes, rinse immediately with plenty of water and seek medical advice. Use appropriate container to avoid environmental contamination.

## Section 16 - Other Information

Information provided is based on our best and present knowledge. This, however, shall not constitute a guarantee for any specific product features and shall not establish a legally said contractual relationship.

Department issuing MSDS Incure Inc. / Incure Adhesives Manufacturing Pte Ltd  
Contact support@uv-incure.com