Rubber Lining and Pulley Lagging Procedures

SA 2000+, SA 4000+ & ECRF

The key to a successful bonding process is in the preparation of the surfaces to be covered.
The following information details the steps to be taken to achieve the optimum results in the use of FUSION Cold Bond Adhesives for lagging and lining applications.

SURFACE PREPARATION – RUBBER TO METAL:

All surfaces must be clean, dry, and free of oil or other contaminants.

1. Remove all weld splatter, sharp edges or irregularities by surface grinding. Weld seams etc. should be 3 mm (1/8") or less.
2. Degrease the surface using the **RC Fusion Surface Prep** solvent.
3. Blast cleaning of the surface to NACE 1. White metal blast class 2.5 - 3.0 is a recommended procedure. Grinding using a 16-grit disc 2800 rpm grinder or a steel grinding disc at 5000 r.p.m. will achieve an acceptable surface texture. A crosshatch pattern surface grind is preferred. (See attached blasting specs.)
4. Remove all blast residues by brushing or vacuuming. Take care not to contaminate the surface after cleaning. Clean the prepared surface with a light wipe of the cleaning solvent. If necessary, cover the prepared surface.
5. When bonding rubber to metal, prime the surface with Almex Fusion Metal Primer immediately after blasting and cleaning is complete. apply a thin coat of primer evenly, using a brush or short nap roller, taking care to avoid runs or puddles.
6. The primed surface must be allowed to dry thoroughly, about 30 to 60 minutes depending on the environmental conditions.

NOTE: Primed metal surfaces can be held for as long as 7 days when properly stored away from direct sunlight, and in a clean and dry environment. Surfaces primed with Almex Fusion adhesive/hardener mixture should be processed within 24 hours.

ADHESIVE/HARDENER PREPARATION

1. Mix the adhesive/hardener together. Mix one bottle of 35 gram corresponding hardener per 660 gr quart/liter **ECRF** cement, **SA 4000+** or with 1kg of **SA 2000+** adhesive.
2. A thorough mix is required by stirring not shaking. All Almex Fusion cements are supplied in a wide mouth container for ease of mixing and application.

COATING

1. Apply a uniform first coating adhesive to the primed metal surface and allow it to dry. (Normally 60 minutes)
2. At the same time apply a coat of adhesive to the rubber surface using a stiff brush. With a circular motion, scrub or work the adhesive into the rubber applying a uniform coating and allow it to dry.
3. If the surface of the rubber has already been primed with a coating of adhesive, apply the adhesive coating with a brush or roller with a rolling or painting action. DO NOT SCRUB the adhesive into the primed surface
4. Once the primed surfaces are dry, apply a second tie coat to both surfaces. When the surfaces are dry to a tack; normally this takes about 5 minutes for **SA 2000+** and **SA 4000+,** 8-10 minutes for **ECRF**; the two surfaces can be bonded together.

BONDING

Place the rubber onto the steel surface. Roll or stitch the rubber onto the steel, applying pressure to ensure maximum surface contact. Pay particular attention to joints and edges and avoid air bubbles. A 2" roller or rubber mallet, working out from the center, can be used to assist in the bonding process however care should be taken to avoid creating excessive deformation of the rubber. If the coated surfaces become too dry, apply an additional coat as previously detailed.

JOINT SEALING – (EASY FIX NS or E6000 or similar)

For the sealing of joints against moisture and material fines when rubber lining or pulley lagging, we recommend the use of **FUSION EASY FIX**. This product has excellent adhesion to steel and rubber and outstanding wear resistance. It is ideally suited in the lagging of crown-faced pulleys. Technical specifications are available upon request.

SURFACE PREPARATION – RUBBER TO RUBBER:

ALMEX/FUSION Lining, lagging and cold repair materials.

All the above-mentioned products are supplied with a proprietary special bonding layer which eliminates the need for surface preparation or buffing of the rubber product.
It is recommended that the bonding layer surface be wiped with a damp cloth using Fusion Cleaning Solvent. Once the solvent has evaporated, (normally two to three minutes) the cement can be vigorously applied using a good brush or a 9" adhesive application roller.

Allow the cement to dry until slightly tacky or until the cement does not stick to the back of the finger. Place the two surfaces together and apply pressure either with a roller or a rubber mallet.

RUBBER without Bonding Layer

Where there is no bonding layer provided, the rubber surface to be bonded should be prepared as follows:

1. Remove any surface contamination or dirt by wiping the surface of the rubber with Fusion Clean, cleaning solvent using a damp lint free cloth.
2. Buff the surface of the rubber using a low speed (2800RPM) 7", 16 or 24 grit sanding disc, or tungsten carbide buffing tool. (Avoid the use of high speed grinders, as this will burn the rubber.)
3. Remove any residual buffing dust using a clean hand brush.
4. Apply an even primer coating of adhesive/hardener avoiding any puddles or runs and allow to dry. (30 – 60 min) depending on the working conditions.
5. Apply a second coating of adhesive/hardener to the primed surface, and allow to dry until tacky to the touch. place the two primed surfaces together and stitch vigorously, applying pressure with a roller and/or rubber mallet.

TYPICAL BONDING MISTAKES

1. Bonding when the adhesive is too DRY

This is the most common cause of bond failure. The bond will be poor and spotty. If this occurs, re-coat the surfaces to be bonded as recommended in the application procedures

2. Bonding when the adhesive is too WET

Test the coated surface with the back of the finger. It should feel tacky, but not leave a residue on your finger. If the surfaces are placed together when the surfaces are too wet, the initial bonding strength will be poor. However, the adhesive/hardener mixture will cure over time, as the solvent in the adhesive evaporates.

3. Bonding with inadequate pressure

Sufficient pressure should be applied to ensure maximum surface contact. The ultimate strength of the bond is improved as surface contact pressure is increased. There are a number of ways to apply surface pressure. The addition of continuous weight or pressure is advantageous where insufficient pressure can be applied by hand. In such cases, items may be left to stand under pressure, if necessary, overnight.

There are times when the lining or bonding process is carried out prior to the tack phase. This is a controlled lining procedure and is normally carried out when the items to be lined are large, such as in tank or chute lining; and are not to be placed into service for some time. From a practical standpoint, when the lining of large surface areas is to be carried out, the application of the lining whilst the adhesive is still moist will allow the rubber lining to be re-positioned if needed. Once the lining is in place, pressure must be applied as detailed in the application procedure.

DRY FITTING

This is the term given to the pre-positioning of the rubber lagging or lining prior to the application of the adhesive. This is a very effective method of installation and can considerably simplify the lining process. Contact your Fusion rubber specialist for further technical assistance if required.

HOW TO SPECIFY SAND BLASTING PREPARATION

Your coating supplier will always designate the degree of surface preparation required for his materials. The three basic standards used to describe surface preparation are the Steel Structures Painting Council (SSPC) "Surface Preparation Specifications", the National Association of Corrosion Engineers Standards (N.A.C.E.) and the Swedish Pictorial Standards. Their definitions are:

SSPC	SWEDISH*	NACE	DESCRIPTION
SP1, Solvent Cleaning	n/a	n/a	Removal of oil, grease, dirt, soil and contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.
SP2, Hand Tool Cleaning	St 2	n/a	Removal of loose rust, loose mill scale and loose paint by hand chipping, scraping, sanding and wire brushing.
S1P 3, Power Tool Cleaning	St 3	n/a	Removal of loose rust, loose mill scale, and loose paint by power tool chipping, descaling, sanding, wire brushing and grinding.
SP 5, White Metal Blast Cleaning	Sa 3	1	Removal of all visible rust, mill scale, paint and foreign matter by blast cleaning.
SP 6, Commercial Blast Cleaning	Sa 2	3	Blast cleaning until at least two-thirds of each inch is free of all visible residues
SP 7, Brush-Off Blast Cleaning	Sa 1	4	Blast cleaning of all except tightly adhered residues of mill scale, rust and coatings.
SP 8, Pickling	n/a	n/a	Complete removal of rust and mill scale by acid pickling, duplex pickling, or electrolytic pickling.
SP 10, near White Blast Cleaning	Sa 2 ½	2	Blast cleaning until at least 95% of each Square inch is free of all visible rust, mill scale, paint and foreign matter.
SP 11-87T, Power Tool Cleaning to Bare Metal	n/a	n/a	Removal of all visible rust, mill scale, paint and foreign matter using power tools and producing a minimum profile of 1 mil.

* Also SSPC-Vis 1 Standard

ABRASIVE PROFILE COMPARATIVE CHART

The following chart should be used for approximating the abrasive size required to obtain a
specified anchor pattern. The standard metal used to obtain these results was hot rolled steel with tightly adhering mill scale. The resulting depth of anchor pattern will vary with the method used for measuring depths as well as any one of numerous other variables (type and hardness of steel, thickness of mill scale, degree of cleaning specified, etc.) This information can be used for centrifugal wheel as well as pressure blasting. Pressure blasting should be done using 90 -100 p.s.i. nozzle pressure. The depth of anchor pattern used in this chart is an average and not a minimum or maximum depth obtainable. Consult local abrasive suppliers for specific technical data.

1 Mil Profile 30/60 Mesh Silica Sand G-80 Steel Grit S-110 Steel Shot* 80 Mesh Garnet 100 Grit Aluminum Oxide Clemtex #3 Black Beauty 2040	1.5 Mil Profile 16/35 Mesh Silica Sand G-50 Steel Grit S-170 Steel Shot* 36 Mesh Garnet 50 Grit Aluminum Oxide Clemtex #3 Black Beauty 2040
2 Mil Profile 16/35 Mesh Silica Sand G-40 Steel Grit S-230 Steel Shot* 36 Mesh Garnet 36 Grit Aluminum Oxide Clemtex #2 Black Beauty 1240	2.5 Mil Profile 8/35 Mesh Silica Sand G-40 Steel Grit S-280 Steel Shot* 16 Mesh Garnet 24 Grit Aluminum Oxide Clemtex #2 Black Beauty 2040
3-4 Mil Profile 8/20 Mesh Silica Sand G-25 Steel Grit S-330 or 390 Steel Shot* 16 Mesh Garnet 16 Grit Aluminum Oxide Clemtex #2 Black Beauty 1240	

*Steel shot alone will not give a good angular anchor pattern and should be used in combination with steel grit for best results.

DEW POINT CALCULATION CHART

FARANHEIT (ºF)

Degree

% Relative Humidity	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
90%	18	28	37	47	57	67	77	87	97	107	117
85%	17	26	36	45	55	65	75	84	95	104	113
80%	16	25	34	44	54	63	73	82	93	102	110
75%	15	24	33	42	52	62	71	80	91	100	108
70%	13	22	31	40	50	60	68	78	88	96	105
65%	12	20	29	38	47	57	66	76	85	93	103
60%	11	19	27	36	45	55	64	73	83	92	101
55%	9	17	25	34	43	53	61	70	80	89	98
50%	6	15	23	31	40	50	59	67	77	86	94
45%	4	13	21	29	37	47	56	64	73	82	91
40%	1	11	18	26	35	43	52	61	69	78	87
35%	-2	8	16	23	31	40	48	57	65	74	83
30%	-6	4	13	20	28	36	44	52	61	69	77

Dew Point:

Temperature at which moisture will condense on the surface. No coatings should be applied unless the surface temperature is a minimum of 5 ºF above this point. Temperature must be maintained during curing.

Ex.)

If air temperature is 70 ºF and relative humidity is 65%, the dew point is 57 ºF. No coating should be applied unless the surface temperature is 62 ºF minimum.

CELCIUS (ºC)

Degree

% Relative Humidity	-7°	-1°	4°	10°	16°	21°	27°	32°	38°	43°	49°
90%	-8	-2	-3	8	14	19	25	31	36	42	47
85%	-8	-3	2	7	13	18	24	29	35	40	45
80%	-9	-4	1	7	12	17	23	28	34	39	43
75%	-9	-4	1	6	11	17	22	27	33	38	42
70%	-10	-6	-1	4	10	16	20	26	31	36	41
65%	-11	-7	-2	3	8	14	19	24	29	34	39
60%	-12	-7	-3	2	7	13	18	23	28	33	38
55%	-13	-8	-4	1	6	12	16	21	27	32	37
50%	-14	-9	-5	-1	4	10	15	19	25	30	34
45%	-15	-11	-6	-2	3	8	13	18	23	28	33
40%	-17	-12	-8	-3	2	6	11	16	21	26	31
35%	-19	-13	-9	-5	-1	4	9	14	18	23	28
30%	-21	-16	-11	-7	-2	2	7	11	16	21	25

Dew Point:

Temperature at which moisture will condense on the surface. No coatings should be applied unless the surface temperature is a minimum of -15 ºC above this point. Temperature must be maintained during curing.

Ex.)

If air temperature is 21 ºC and relative humidity is 65%, the dew point is 14 ºC. No coating should be applied unless the surface temperature is 17 ºC minimum.