

INSTALLATION GUIDE AND INSPECTION FORM

PIPE SUPPORT MECHANICAL PROTECTION SYSTEM



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Pipe Support Installation Guide

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Pipe Support General Information

The Pipe Support system is designed to protect pipes at support or hanger locations. Pipe Support is comprised of 3 pre-cured, composite split-sleeves (2 unidirectional, and 1 bi-directional), the Filler resin system, and the Adhesive resin system. The individual layers of the system form a sacrificial surface at support locations to protect the pipe from abrasion or other movement to prevent crevice corrosion and galvanic corrosion.

To ensure the effectiveness of the Pipe Support technology, the product must be properly installed, and the technology correctly applied. This installation guide is intended to outline the basic installation steps and to broadly describe the installation principles for the Pipe Support system. Installers are advised to acquire, read and understand the procedures and processes detailed in this manual.

The Pipe Support system should be protected from UV radiation by coating with an opaque or other UVrated coating to ensure long-term effectiveness.

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Pipe Support Scope & Limitations

This document is intended to be used for coating/pipe protection with the following considerations:

- Installation of the Pipe Support protection system for mechanical protection of coatings / pipes at support or hanger locations.
- It is not intended to be a repair system for excessive corrosion or damage (use one of CSNRI's repair systems for this purpose if required).
- The Pipe Support system is not a coating.
- Do not use if the continuous operating temperature of the pipe will exceed 158°F (70°C).
- If exposed to excessive or aggressive chemicals, or UV radiation, a protective topcoat should be applied to ensure long-term effectiveness of the Pipe Support system.
- The Pipe Support system may be applied in diverse weather conditions (cold weather, high humidity, etc.) but the installation area should be protected (tented, etc.) from inclement conditions whenever possible.
- The Pipe Support system must not be installed over any type of soft or elastomeric coating material. Elastomeric materials (rubber based, mastics, visco-elastic, etc.) interfere with proper load transfer and may lead to other complications to the effectiveness of the Pipe Support system.
- Any coatings containing Coal Tar or Zinc must be completely removed from the installation area. Coal tar residue and the presence of Zinc inhibits the curing and bonding properties of the adhesive.
 - Do not use tools having galvanized coatings.
 - Coal Tar may be used as the topcoat, but only AFTER the Adhesive has attained full cure.



Pipe Support Kit Contents

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- 1. Filler
- 2. Filler Activator (orange)
- 3. Adhesive
- 4. Adhesive Activator (blue)
- 5. Pipe Support sleeves (3)*
- 6. Accessory Kit

*The sleeves may also be blue depending on the sleeve diameter size.

Note that components may be purchased separately, so ensure you are ordering a full kit if needed.

Pictures for example only, actual material appearance in hand may look different.





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Adhesive 1A440 200 grams

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Recommended PPE

The following list is the recommended minimum PPE while installing the Pipe Support system. It is not intended to supersede installer or site requirements which may be in place.

- 1. Safety Glasses
- 2. Hard Hat
- 3. Safety Boots
- 4. Rubber Gloves
- 5. Disposable Mask or Other Face Protection (optional)
- 6. Tyvek Suit (optional)



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The following installation steps should be followed to ensure a proper and effective installation of the Pipe Support system. Each installation may present unique challenges and this procedure may need to be modified in some conditions. Any necessary deviation should be discussed with CSNRI prior to installation to ensure it will perform as desired.

Installation Steps Overview

The following are the overall steps in the installation procedure. Continue reading this document for the details associated with the individual steps as well as various tips and tricks to ensure a successful installation is achieved.

- Pre-installation Checks
- Surface Preparation
- Filler Application
- Adhesive Application
- Sleeve Application
- Post-installation Checks

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Prior to beginning the installation process, ensure that the pre-installation check is completed. You may use/reference the Project Information Form at the end of this manual.

The following items should be verified by the project inspector or certified personnel who are not directly involved in the Pipe Support installation process, to confirm that key aspects are being completed correctly.

Pre-Installation Checklist

- Record all Lot #'s and Expiry dates for Filler and Adhesive components, and ensure they are within expiry dates.
- Ensure you have all 3 of the Pipe Support sleeves and know the number/order to install (they should be numbered appropriately).
- Surface preparation of the existing coating over the area of Pipe Support installation has been completed.
- Environmental and pipe surface temperatures are recorded correctly and accurately.
- Installation guide marks are made to ensure the Pipe Support will be centered in the area of the support mechanism.
- Any condensation which may have formed on the piping is removed as needed using appropriate methods.



Surface Preparation

For installation on bare pipe*:

The area to be protected must be cleaned, removing all scale, loose debris, products of corrosion and residual pipe coating. The surface should contain a slight anchor pattern when complete. Media blasting the pipe surface is recommended as best practice. If blasting is not possible, power tool clean to bare metal with an anchor profile of at least 1 mil is also acceptable.

*Note that the Pipe Support system is not a coating, and the edges should be sealed appropriately with an approved coating if being installed on bare pipe to prevent potential corrosive media ingress.

For installation on existing coating (if compatible)**:

The area to be protected should be cleaned, removing any dirt, grease, or other debris from the existing coating. Once cleaned, the surface of the coating should be scuffed so that the surface is not smooth and there is an anchor pattern to promote bonding. This may be achieved by numerous means, including but not limited to, wire brushing, wire wheel, sandpaper, and other such tools and methods that can scratch the surface without damaging the coating.

**See previous information on incompatibility with soft coatings, zinc, and galvanized surfaces.

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*** Note on Filler and Adhesive Updates & Mix Ratios ***

- CSNRI has released improved Filler and Adhesive materials.
- During the transition, you may have or receive the existing version or the new version of either one and should know the difference and how to ensure you use the correct mix ratio according to the requirements.
- Each system has new labels which will be visually different than previous labels for easy differentiation. If you do not have these new labels, then previous ("old") mix ratio charts should be used as shown in this Installation Guide, or on the respective packaging.
- The new labels are shown as examples with the updates in the following pages.



Filler Resin 450 grams | CSF-016 | CSF-P-016-2

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Mix CSFA-001 filler activator with CSF-016 filler resin according to the Installation Guide.

Filler Resin **Danger!** CAS# 14808-60-7, 80-62-6, 1344-28-1, 1305-62-0, 13983-17-0.

Highly flammable liquid and vapor. Causes skin irritation and/or allergic skin reaction. Causes serious eve irritation. May cause respiratory irritation. Keep away from heat/ sparks/open flames/ hot surfaces. No smoking. Keep container tightly closed. Ground/ bond container and receiving equipment. Use explosion-proof electrical/ ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/fume/gas/mist/ vapors/spray. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/eye protection/face protection. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. Take off contaminated clothing and wash it before reuse. Refer to SDS for further information: www.cs-nri.com/SDS.

DO NOT FREEZE. STORE BETWEEN 50°F - 72°F. FOR INDUSTRIAL USE ONLY. Emergency Phone #: CHEMTREC: 800.424.9300 Outside USA: +1 703.741.5970

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Rev. 05

New Filler Labels

- Green color bars at tops of labels.
- New part numbers listed (CSF-016 for Filler Resin, and CSFA-001 for Filler Activator)
- Updated Filler Activator kit size of 40 grams.
- Instructions to reference the Installation Guide for mixing & mix ratios.
- Updated company website (CSNRIcomposites.com) at the bottom in the yellow color bars.
- Mix ratio charts have been removed from the labels.
- Labels are listed as Rev. 05.

ACTIVATOR for Filler 40 grams | CSFA-001 | CSFA-P001-2

Mix CSFA-001 filler activator with CSF-016 filler resin according to the Installation Guide. Activator for Filler Warning! CAS#471-34-1.25068-38-6.16883-83-3. 105-76-0. 26299-47-8. 94-36-0. 131298-44-7 Causes skin irritation and/or allergic skin reaction. Causes serious eve irritation. Avoid breathing mist/vapors. Wash thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace. Wear eye protection/face protection. Wear protective gloves. If on skin: Wash with plenty of water. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. Refer to safety data sheet for further information: www.cs-nri.com/SDS DO NOT FREEZE. STORE BETWEEN 50°F - 72°F. FOR INDUSTRIAL USE ONLY.

Emergency Phone #: CHEMTREC: 800.424.9300 Outside USA: +1 703.741.5970

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New Adhesive Labels

- Blue color bar at the top of the Adhesive Activator label, no red color bar at the bottom.
- New part numbers listed (CS-A for Adhesive Resin, and CS-AA for Adhesive Activator)
- Instructions to reference the Installation Guide for mixing & mix ratios.
- Updated company website (CSNRIcomposites.com) at the bottom of the labels.
- Mix ratio charts have been removed from the labels. CS picture added on Adhesive Resin container.
- Labels are listed as Rev. 04.



ACTIVATOR for Adhesive 80 grams | CS-AA-003 | CS-PAA-003-2

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Mix CS-AA-003 adhesive activator with CS-A adhesive resin according to the Installation Guide. Activator for Adhesive Warning! CAS# 16883-83-3, 105-76-0, 94-36-0, 131298-44-7, 9038-95-3

Causes skin irritation and/or allergic skin reaction. Causes serious eye irritation. May cause respiratory irritation. Avoid breathing mist/vapors. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear eye protection/face protection and protective gloves. If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses. if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. Take off contaminated clothing and wash it before reuse. Store in a wellventilated place. Keep container tightly closed. Refer to SDS for further information: www.cs-nri.com/SDS. DO NOT FREEZE. STORE BETWEEN 50°F - 72°F. FOR INDUSTRIAL USE ONLY. Emergency Phone #: CHEMTREC: 800.424.9300 Outside USA: +1 703.741.5970

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Rev. 04

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*** Note on Filler and Adhesive Updates & Mix Ratios ***

- Please keep the following pieces of information in mind if you have stock of these materials:
 - Do not mix old resin with new activators, and vice versa, for the Filler and Adhesive kits.
 - The mix ratio chart listed on the old Filler kits **DOES NOT APPLY** to the new Filler kits.
 - Additionally, take note that the New Filler Activator pouches are now a single 40-gram kit, rather than a 20-gram kit as the old ones were, so be sure you are measuring correctly when mixing based on this. Never mix more than one new Activator packet per 450-gram Filler Resin kit.
 - A Filler "kit" now comes with one (1) container of Filler Resin and one (1) container of Filler Activator, rather than two (2) containers of Filler Activator.



Mixing the Filler

- For the following charts to be accurate, the resins must be room temperature (70-75°F). Keeping them in a temperature-controlled environment before use will help with this. If they are kept in colder environments, allow enough time to warm them prior to mixing to ensure the desired cure times are met.
- Filler material is a methacrylate paste consisting of a resin and an activator. The resin and activator will be mixed according to the temperature. Refer to the chart on the following pages for the proper mix ratio for your situation.
- The tables are provided on the following pages for reference only and are variable based on temperature in the field and temperature at which it has been stored. Determine the ambient temperature and the temperature of the pipe and use the higher of the two as your guiding temperature to determine mix ratio ("*Determined Temperature*").
- Before mixing together, knead the Activator packet individually with thumbs to soften and ensure no settling has occurred.
- On a flat surface, such as cardboard scrap, mix the filler and activator until the mixture is uniform in color and completely mixed with no streaking or marbling of colors.



Partially Mixed



Completely Mixed

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Updates to FILLER mix ratios with new packaging

Note that the mix ratio and working time as shown on the old packaging for the Filler kits is only applicable if you have both the Old Filler and Old Filler Activator packaging.

OLD PACKAGING

The following charted weight of Filler Activator is intended for mixing with 450 grams of Filler Resin to achieve the approximate working times given.

Ambient Te	emperature	Activator	Approximate
°F	°C	Quantity (grams)	Working Time (minutes)
10 to 30	-12 to 0	50	60
30 to 50	0 to 10	40	60
51 to 64	11 to 17	30	45
65 to 74	18 to 23	20	45
75 to 89	24 to 31	15	35
90 to 120	32 to 49	10	25



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Updates to FILLER mix ratios with new packaging



If you have a **NEW** packaging for the **Filler Activator**, only the new mix ratio and new working time on this page will be correct, even with old packaging of Filler.

Temperatures (both storage and job/environmental temperatures) will influence the working times. The following chart is based on storage in room temperature conditions, and a whole kit of 450 grams Filler Resin plus the stated grams of Filler Activator is mixed.

DO NOT mix more than 40 grams of Filler Activator into a 450-gram Filler Resin kit.

DO NOT mix less than 20 grams of Filler Activator into a 450-gram Filler Resin kit.

NEW PACKAGING: CSF (Filler Resin) & CSFA (Filler Activator)

The following charted weight of Filler Activator is intended for mixing with 450 grams of Filler Resin to achieve the approximate working times given.

Deterr Tempe	nined rature	Activator Quantity	Approximate Working Time		
°F	°C	(grams)	(minutes)		
40 to 59	4 to 15	40	30-40		
60 to 89	16 to 31	30	20-30		
90 to 100	32 to 38	20	15-20		

Using the Filler

Once fully mixed, apply filler material to all pits, voids, and over transitions (such as welds), etc., to ensure any gaps will be filled with the filler when the sleeves are installed.

It is important to the successful operation of the Pipe Support system, that there are no gaps or air pockets remaining beneath the sleeves, so installation of Filler is important to ensure this does not occur.







Mixing the Adhesive

Mix the adhesive resin and activator according to the 30-60-90 rule. Ensure the components are fully and completely blended with no streaking or marbling of colors.

- Premix the adhesive resin in the can for 30 seconds.
- Add the activator and mix the combination for 60 seconds.
- Scrape the sides of the mixing container and then mix for 90 seconds.





Partially Mixed



Completely Mixed

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Updates to FILLER mix ratios with new packaging

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Note that for the **Adhesive** kits, they may only be mixed using Old/Old resin and activator, or New/New resin and activator.

The Adhesive kits may **NOT** be mixed using any Old/New combination.

Insta	llation		Adhesi	Approximate				
Temp	erature	650	1200	Working Time	Cure Time			
°C	°F		Activat	(minutes)	(hours)			
-12	10	70	129	183	258	323	50	2. <mark>5</mark> - 3
-7	20	60	111	157	222	277	50	2.5 - 3
-1	30	50	92	131	185	231	30	2.5 - 3
4	40	45	83	118	166	208	30	2.5 - 3
10	50	45	83	118	166	208	30	2 - 2.5
16	60	40	74	105	148	185	23	1. <mark>5 - 2</mark>
21	70	30	55	78	111	138	23	1. <mark>5</mark> - 2
27	80	25	46	65	92	115	23	1.5 - 2

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Updates to FILLER mix ratios with new packaging

NEW PACKAGING: CS-A (Adhesive) & CS-AA (Adhesive Activator)

Detern Temper	nined rature	Activator Quantity (grams) for Stated Resin Size						Approx. Working Time		
°F	°C	200	400	650	1200	1700	2400	3000	3300	(minutes)
40 to 59	4 to 15	25	50	80	160	220	300	380	420	50
60 to 89	16 to 31	20	40	70	140	180	260	340	360	35
90 to 100	32 to 38	20	40	60	120	160	220	300	320	25

DO NOT mix more Adhesive Activator than the maximum value or minimum value as listed in this chart for the identified Adhesive Resin kit size.



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Zinc Check \checkmark

If pipe coating in the area contains zinc or coal tar, apply a small sample of the adhesive to verify the repair surface is adequately cleaned. If the adhesive changes from blue to green, the area needs to be cleaned again, or the adhesive will not cure properly.

Working time begins once activator is mixed. For more detailed mixing instructions and cleanup, disposal, and storage requirements for these materials, see the product SDS.



Installing the Sleeves

Liberally apply the mixed adhesive to the filler material and pipe surface to be protected.

Apply the #1 concentric sleeve over the filler and adhesive, facing the longitudinal seam 90-degrees away from the support point.

Apply filler material to the longitudinal seam of the first sleeve and adhesive to the entire outer surface of the first sleeve.

Apply the #2 sleeve with the longitudinal seam away from the first sleeve's seam, and then apply adhesive to the outer surface of that sleeve.

Apply the #3 sleeve with the longitudinal seam positioned away from the longitudinal seams on the underlying sleeves and away from the support point.

Using the band clamps supplied, tighten the Pipe Support system onto the pipe. The band clamps should be spaced evenly along the sleeve and tightened from the center out to each end.

Clean away any excess adhesive and filler material that has been extruded from the sleeve during the band tightening.

Note: It is also permissible to apply the adhesive to the interior of each sleeve to install rather than the exterior of the one in place. This is a matter of preference.

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Installing the Sleeves













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Finishing Up

When the adhesive has fully cured, remove the band clamps.

Perform final inspections per the Inspection Checklist and complete the form with relevant and accurate data.

Apply any approved/preferred topcoat to the Pipe Support and surrounding area with a protective coating as and if needed.





Prior to beginning the installation process, ensure that the pre-installation check is completed. You may use/reference the Project Information Form at the end of this manual.

The following items should be verified by the project inspector or certified personnel who are not directly involved in the Pipe Support installation process, to confirm that key aspects are being completed correctly.

Pre-Installation Checklist

- Record all Lot #'s and Expiry dates for Filler and Adhesive components, and ensure they are within expiry dates.
- Ensure you have all 3 of the Pipe Support sleeves and know the number/order to install.
- Surface preparation of the existing coating over the area of Pipe Support installation has been completed.
- Environmental and pipe surface temperatures are recorded correctly and accurately.
- Installation guide marks are made to ensure the Pipe Support will be centered in the area of the support mechanism.
- Any condensation which may have formed on the piping is removed as needed using appropriate methods.



Inspection Checklist (cont...)

The following items should be verified by the project inspector or certified personnel who are not directly involved in the Pipe Support installation process, to confirm that key aspects are being completed correctly. You may use/reference the Project Information Form at the end of this manual.

Installation Inspection

- Appropriate amount of Activator is mixed with Adhesive and Filler materials.
- Apply Filler (if and as needed) to any voids or transitional areas if near welds.
- Sufficient adhesive coverage is applied to the entire pipe surface and filler areas.
- Installers continuously confirm adequate adhesive application on the bottom section of the pipe and over all surface of the Pipe Support layers.
- Installers apply the appropriate Pipe Support sleeve number in the correct order.
- Installers ensure the longitudinal seam of each Pipe Support sleeve is located at least 90 degrees away from the previous sleeve's longitudinal seam.
- Band clamps are spaced evenly along the Pipe Support sleeve and are tightened beginning in the center of the sleeve working toward the outer edges.
- Installers remove any excess Filler and Adhesive from both edges of the Pipe Support installation.

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Inspection Checklist (cont...)

Final Inspection

- Band clamps removed once Adhesive is fully cured.
- The outer Pipe Support sleeve must be the bi-directional fabric sleeve and confirmed to be the #3 sleeve.
- There should be no gaps or voids between Pipe Support and pipe substrate or between Pipe Support sleeve layers.
- Once cured, Adhesive hardness to be validated either with a Shore A Durometer reading of 40, or by "thumbnail test" (when pressed with a thumbnail, no indention in material remains when removed).
- Repair SHOULD be coated for protection if in an aggressive environment subjected to chemical contact or extreme UV exposure.



Project Information Form

Material & Project Data

Date of Install:		Project ID #:	
Sleeve Serial #(s):		Location:	
Adhesive Resin Lot #(s):		Pipe Diameter:	
Resin Expiry Date:		Pipe Temperature:	
Adhesive Activator Lot #(s):	(Blue)	Environmental Temperature:	
Activator Expiry Date:		Existing Coating Type:	
Filler Resin Lot #(s):		Surface Prep Method Used:	
Resin Expiry Date:		Additional Notes:	(Confirm cure via hardness check)
Filler Activator Lot #(s):	(Orange)		
Activator Expiry Date:			



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