



## ELECTROCENTRALE BUCUREȘTI S.A.

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### SECȚIUNEA II

CAIET DE SARCINI NR. 8S/2025  
PENTRU EXECUȚIA LUCRĂRII:

LN3 Reparatie Coș fum Centrala Ciclu Combinat – CTE VEST

#### Cap.I. OBIECTUL CAIETULUI DE SARCINI

Obiectul prezentului caiet de sarcini îl constituie obligațiile și răspunderile ce revin contractanților conform reglementărilor legale în vigoare privind reparația de tip LN 3 la mijlocul fix Cazan recuperator – Coș de fum, nr.inv. 28189 din cadrul S.C.Electrocentrale București S.A./ Centrala Termoelectrică Vest

#### Cap.II. CARACTERISTICI, PARAMETRII TEHNICI

Mijlocul fix care face obiectul reparației menționate la cap.I, a fost pus în funcțiune în martie 2009 și a înregistrat până la data de prezentei un număr de 5 ani de funcționare.

Caracteristicile tehnice ale coșului de fum sunt stipulate în anexa 3 a prezentului caiet de sarcini.

#### Cap.III. SCOPUL EXECUTIEI LUCRĂRII

În urma executării lucrărilor de reparații prevăzute în prezentul caiet de sarcini se reface protecția externă a coșului de fum în vederea menținerii în stare de funcționare a acestuia.

#### Cap.IV. NOMENCLATORUL LUCRĂRILOR

În anexa nr.1 a prezentului caiet de sarcini este prezentată tabelar lista cantităților de lucrări care se solicită a fi executate.

#### Cap.V. DURATA ȘI PERIOADA DE EXECUȚIE

Contractantul va finaliza execuția lucrării în termen de 30 zile calendaristice de la predarea frontului de lucru.

#### Cap.VI. MATERIALELE NECESARE EXECUȚIEI LUCRĂRII

Anexa nr. 2 cuprinde lista materialelor de bază care trebuie asigurate pentru execuția lucrării. În anexă au fost marcate materialele de bază care se asigură de executant și cele care se asigură de beneficiar.

Materialele mărunte (inclusiv diluantul) se asigură în totalitate de executant.

#### Cap.VII CERINȚE TEHNICE IMPUSE DE AUTORITATEA CONTRACTANTĂ ÎN

##### FAZA DE OFERTARE

Oferta tehnică va cuprinde date tehnice și informații care să dovedească că lucrările solicitate se vor executa respectând cerințele caietului de sarcini.

1. În oferta tehnică executantul va certifica realizarea lucrărilor solicitate în anexa nr. 1 și asigurarea materialelor prezentate în anexa 2.
2. În cadrul ofertei tehnice se va prezenta graficul de execuție a lucrării completând formularul corespunzător din documentația de atribuire.
3. În oferta tehnică se vor înscrie în mod obligatoriu informații privind termenul de execuție și garanțiile tehnice oferite.
4. În cadrul ofertei tehnice, executantul va face dovada respectării reglementărilor în vigoare referitoare la securitatea și sănătatea în muncă (Legea protecției muncii nr.319/2006; Normele metodologice de aplicare a prevederilor Legii securității și sănătății în muncă nr.319/2006, aprobate prin HG 1425/2006, cu completările și modificările aprobate prin HG 955/2010; PE205/1981 norme de protecție a muncii pentru partea mecanică a centralelor electrice).

#### **Cap.VIII CONDIȚII TEHNICE IMPUSE DE AUTORITATEA CONTRACTANTĂ LA EXECUȚIA LUCRĂRII**

1. Lucrările trebuie să corespundă documentațiilor tehnice de execuție și de calitate, tuturor probelor și încercărilor finale prevăzute în documentațiile de execuție, caietului de sarcini și procedurilor specifice de management al calității, prevăzute în manualul de calitate propriu.
2. Executantul trebuie să supună spre avizare beneficiarului, planul de calitate (PC), înaintea semnării contractului, răspunzând apoi de realizarea acestuia și va înștiința achizitorul asupra eventualelor neconformități. Planul calității trebuie să conțină și cerințe specifice privind aspectele de mediu și de securitate și sănătate în muncă (ex. managementul deșeurilor, măsuri pentru prevenirea accidentelor ecologice și pentru readucerea zonei de lucru la starea inițială, riscurile generate de activitățile proprii; măsuri de prevenire în scopul evitării accidentelor care pot afecta personalul și instalațiile atât ale beneficiarului cât și ale executantului, etc, după caz);
3. Executantul trebuie să asigure tehnologiile pentru executarea lucrărilor pe baza procedurilor de management al calității conform manualului propriu al calității;
4. Executantul are obligația de a asigura numai personal calificat și autorizat pentru executarea lucrărilor.
  - Pentru lucrările de vopsitorie, personalul trebuie să fie calificat, adică să dețină certificat de calificare profesională în domeniul vopsitoriei;
  - Pentru lucrările la înălțime, personalul trebuie să dețină autorizație pentru lucrul la înălțime;
  - În cazul în care se optează pentru execuția lucrărilor cu alpiști utilitari, aceștia trebuie să dețină atestat de alpinist utilitar.
5. Executantul trebuie să pună la dispoziția beneficiarului declarațiile de conformitate și certificatele de calitate pentru materialele procurate prin grija sa;
6. Executantul trebuie să întocmească și să pună la dispoziția achizitorului documentația de reparație care atestă volumul și calitatea lucrărilor executate conform legislației în vigoare;
7. Executantul trebuie să asigure condițiile de acces al personalului autorizat al achizitorului la punctele și documentele precizate în PC-ul lucrărilor (V,W,H);



8. Executantul trebuie să asigure condițiile de acces al mijloacelor de transport, a utilajelor de mecanizare, astfel încât să nu se producă deranjamente în instalațiile beneficiarului aflate în funcțiune sau în rezervă;
9. Executantul trebuie să predea beneficiarului toate materialele recuperabile rezultate în urma executării lucrărilor și să asigure condiții pentru transportul materialelor refolosibile la depozitul beneficiarului; se vor preda obligatoriu sortate pe tipuri de materiale (Al; Cu; oțel; fier; lemn; hârtie; plastic, etc.).
10. Executantul trebuie să asigure zilnic curățenia la locul de muncă;
11. Executantul va asigura existența unei toalete ecologice pentru personalul propriu.
12. Personalul executantului va fi dotat cu echipament complet de protecție, inscripționat cu sigla firmei.
13. Executantul va asigura protejarea zonei de lucru cu folie de plastic sau plase pentru îngrădire.
14. Executantul este obligat să respecte indicatoarele de pericol.
15. Executantul are obligația de a prezenta factorii de risc la care este expus personalul beneficiarului la predarea mijlocului fix în reparație.
16. Executantul va respecta reglementările legale în vigoare referitoare la protecția muncii:
  - Legea securității și sănătății în muncă nr. 319/2006 ;
  - Normele metodologice aprobate prin HG 1425/2006;
  - PE 205/1981 – norme de protecția muncii pentru partea mecanică a centralelor electrice;
17. Executantul va respecta reglementările legale în vigoare referitoare la prevenirea și stingerea incendiilor :
  - PE 009/1993 Norme de prevenire, stingere și dotare împotriva incendiilor pentru producerea, transportul și distribuția energiei electrice și termice;
  - Legea 307/2006 privind apărarea împotriva incendiilor;
  - Norme generale de apărare împotriva incendiilor aprobată cu OMAI 163/2007.
18. Lucrările se vor executa cu respectarea prevederilor legislației de mediu în domeniul deșeurilor.

Executantul are obligația de a asigura gestionarea corespunzătoare a deșeurilor și amenajarea spațiilor corespunzătoare fără afectarea factorilor de mediu ( aer, apă, sol). Acesta este direct răspunzător de consecințele producerii unei poluări și va acoperi eventualele daune provocate din vina sa.
19. Executantul este obligat să-și însușească și să respecte politica, procedurile și reglementările de calitate, mediu și securitate și sănătate în muncă ale autorității contractante pe domeniul căreia își desfășoară activitatea.
20. Executantul, pe cât posibil, va utiliza ambalaje biodegradabile.
21. Executantul are obligativitatea de a respecta prevederile legale de mediu în vigoare.
22. Executantul are obligativitatea de a respecta și aplica HGR nr. 856/2002 privind „evidența gestiunii deșeurilor și aprobarea listei cuprinzând deșeurile, inclusiv deșeurile periculoase, Legea 132/2010 privind colectarea selectivă a deșeurilor în instituțiile publice modificată și completată de Legea 194/2019, OUG 92/2021 privind regimul deșeurilor, OUG nr.2/2021 privind depozitarea deșeurilor

## **Cap. IX. RECEPȚIA LUCRĂRILOR DE REPARAȚII**

Recepția lucrărilor se face astfel:

- recepția la terminarea lucrărilor
- recepția finală (după expirarea perioadei de garanție).

## **Cap. X. GARANȚIA TEHNICĂ**

Perioada de garanție tehnică este de **36 luni** de la data semnării procesului verbal de recepție la terminarea lucrărilor, întocmit conform Instrucțiunii PE 027/97, privind recepția lucrărilor de revizii tehnice, reparații curente și de reparații capitale din centralele electrice.

## **Cap. XI. ALTE CERINȚE**

1. Anexele 1, 2, 3 fac parte integrantă din prezentul caiet de sarcini.
2. La elaborarea ofertei tehnice se va ține seama de cerințele descrise în prezentul caiet de sarcini și în Fișa de Date la capitolul specific "Modul de prezentare a propunerii tehnice".
3. Pe toată durata contractului Centrala Termoelectrică Vest asigură executantului, în limita posibilităților, contra cost utilitățile necesare (energie electrică , apă industrială, etc). Consumul de utilități va fi facturat lunar, pe bază de proces verbal încheiat între executant și secția Electrică , din cadrul Centralei Termoelectrice Vest având și viza BM din centrală. Procesele verbale de consum se vor încheia până la data de 05 a fiecărei luni pentru luna anterioară.
4. Pentru organizarea de șantier, beneficiarul poate încheia cu executantul convenții de utilizare fără plată a unor terenuri și/sau spații aparținând achizitorului. Necesarul de teren aferent organizării de șantier va fi specificat în ofertă și va face obiectul contractului.

Sef SCM-AC  
Cristian DUMITRU



Responsabil SCM-AC  
Diana TIȘU





## LN3 Reparatie Coș fum Centrala Ciclu Combinat – CTE VEST

LISTA DE CANTITĂȚI DE LUCRĂRI

Nr. Crt.	Denumire lucrare	UM	Cantitate
1	Pregatire suprafata metalica in vederea aplicarii vopsitoriei anticorozive prin sablare la luciu metalic	mp	450
2	Aplicare strat protector 1 strat (75 $\mu$ m) grund Hempel's Galvosil 15702 (sau echivalent)	mp	450
3	Executie finisaje cu Hempel's Silicone Zinc 16900 1 strat (50 $\mu$ m) (sau echivalent)	mp	450
4	Aplicare vopsea de protecție anticorozivă Hempel's Silicone Acrylic 56940 în 2 straturi (30 $\mu$ m – strat). Culoarele folosite vor fi alb RAL 9010 si rosu RAL 3020	mp	450
5	Placare cu tablă S355 J2G1 W (sau echivalent) zone neconforme	mp	2

**Nota:**

- Lucrarea se execută între cotele 25.5 m si 50 m. Executantul va lua toate măsurile necesare pentru respectarea normelor de securitate a muncii pentru lucru la înălțime.
- Toata baza materiala va fi asigurată integral de către executant si va face parte din oferta de pret (pentru materialele de baza se va sepecifica cantitatile necesare și pretul acestora)
- In cazul in care se vor utiliza materiale echivalente:
  - ✓ se vor avea în vedere caracteristicile de funcționare ale coșului de fum (coș de fum montat în exterior, temperatura de lucru este de cca 100°C, temperatura maximă de lucru poate ajunge până la 230°C, temperatura maximă la care poate rezista cca 300° C, condiții atmosferice vara-iarna etc) – anexam totodata si fisa tehnica a materialelor originale folosite
  - ✓ se vor anexa fisele tehnice ale produselor utilizate si se vor prezenta in clar echivalentele intre materiile oferite si cele solicitate
  - ✓ se va detalia in mod clar cantitatile de materiale de baza necesar a fi utilizate pentru efectuarea integral lucrarea de reparatii
  - ✓ in cazul in care conform tehnologiei de aplicare a materialului echivalent folosit sunt necesare alte lucrări față de cele sus menționate se va preciza in mod detaliat lucrarea, cantitatea si scopul pentru care se executa aceasta

- Toată logistica necesară executării serviciilor de reparații (scule, schelă, utilaje etc) este asigurată de către executant si va face parte din oferta de pret
- Pe întreaga perioada a lucrărilor de reparații, pentru protecția utilajelor/filtrelor aflate în zona de lucru împotriva particulelor de praf ce apare o dată cu curățarea suprafeței metalice acosului de fum, executantul va proteja integral zona de lucru în mod corespunzător (ex.prelata)

DIRECTOR CTE VEST

Dan Tudora



Inginer Sef CTE Bucuresti VEST

Valentin RADU

Sef Sectie Ciclu Combinat

Costin ZISU

Sef STMIU

Alexandra RADULESCU

Intocmit

Carmen DIMITRIU

**LISTA MATERIALELOR DE BAZĂ ASIGURATE DE EXECUTANT**

NR. CRT	DENUMIRE	UM	CANT
1	2	3	4
1	Grund Hempel's Galvosil 15702 (sau echivalent) pentru suprafata de 450 mp	l	*
2	Material pentru finisaj Hempel's Silicone Yinc 16900 (sau echivalent) pentru suprafata de 450 mp	l	*
3	Vopsea anticoroziva Hempel's Silicone Acrylic 56940 alb RAL 9010 (sau echivalent) pentru suprafata de 450 mp	l	*
4	Vopsea anticoroziva Hempel's Silicone Acrylic 56940 rosu RAL 3020 (sau echivalent) pentru suprafata de 450 mp	l	*
5	Tablă S355 J2G1 standard CSNEN 10155 (sau echivalent) pentru suprafata de 2 mp; grosime 10mm	mp	2,00
6	Diluant pentru grund	l	*
7	Diluant pentru diluare Hempel's Silicone Yinc 16900 si Hempel's Silicone Acrylic 56940	l	*

NOTA: Toate materialele mărunte (inclusiv diluantul) vor fi asigurate de executant.

În cazul în care se vor asigura materiale echivalente:

- se vor avea în vedere caracteristicile de funcționare ale coșului de fum (coș de fum montat în exterior, temperatura de lucru este de cca 100°C, temperatura maximă de lucru poate ajunge până la 230°C, temperatura maximă la care poate rezista cca 300° C, condiții atmosferice vara-iarna etc)

\*cantitatea va fi stabilita de executant in functie de tehnologia de executie

Sef SCM-AC  
Cristian DUMITRU



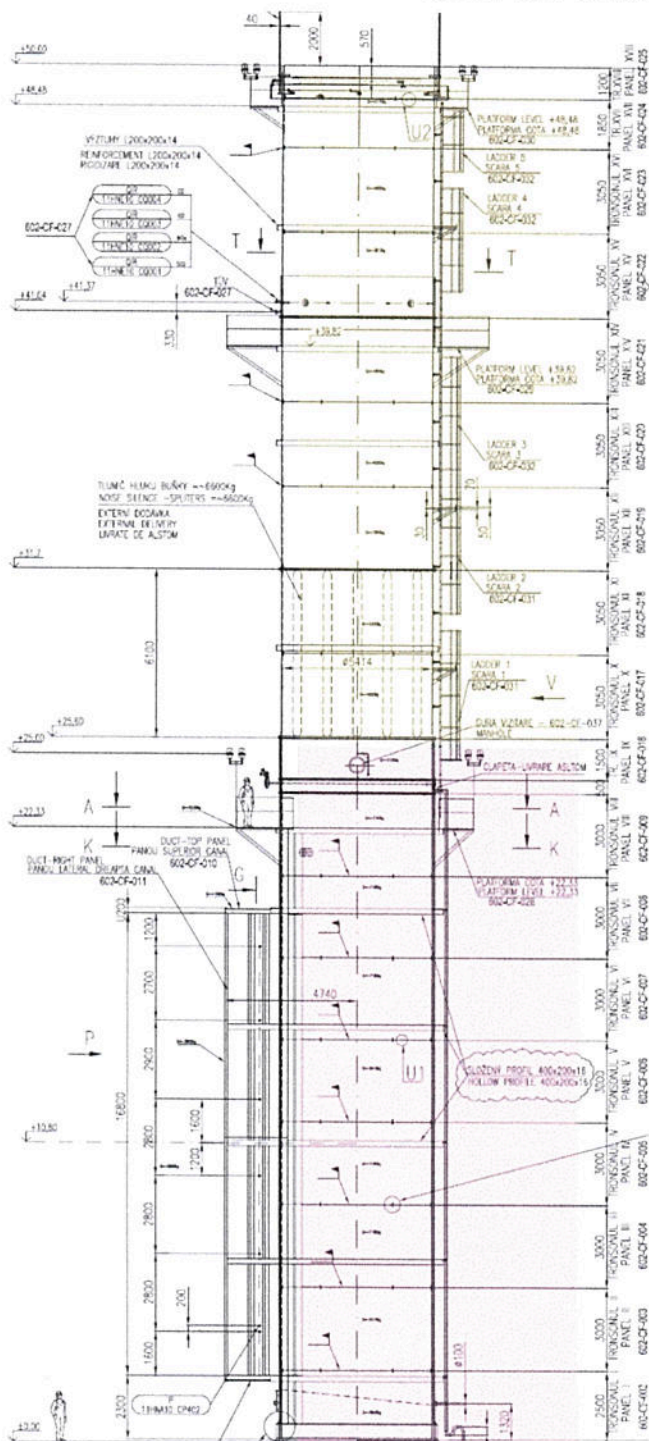
Responsabil SCM-AC  
Diana TIȘU

26.01.2015 



## FISA TEHNICA

## COS FUM CENTRALA CU CICLU COMBINAT



**Cos metalic executat din material S355 J2G1W  
(diverse grosimi de material)**

- inaltime totala 50 m
- diametrul exterior 5452 mm
- izolat termic la exterior pana la cota + 25.5 m (zona marcata cu culoare roz in desen)
- grunduit in totalitate si vopsit anticoroziv in doua straturi de la cota + 25.5 pana la cota + 50 m
- zona neizolata va fi vopsita in tronsoane succesive alb / rosu (zona marcata cu culoare galbena in desen)
- cosul este dotat cu platforme de mentenanta situate la cotele + 48.48m, 39.82 m si 22.5 m platforme circulare cu o latime de 1,5 m
- accesul pe cosul de fum se face prin scari de acces tip pisica prevazute cu protectie si mici platforme intermediare

DIRECTOR CTE VEST,  
Dan TUDORA

SEF SECTIE CICLU COMBINAT,  
Costin ZISU

Sef STMIU,  
Alexandra RADULESCU



## FISA TEHNICA VOPSITORIE

Evidenčni číslo / registration number număr de înregistrare. <b>24 0491</b>	<b>Bucuresti Vest</b>	Cisio dokumentu / Document Number: <i>Numar document : PX-PPPO-059377</i>	
	<b>SUPRAFACE TREATMENT PRESCRIPTION</b> <i>prescriptie tratare suprafete</i>	Zákaznické číslo / Customer's Number <i>Numar client 11xxx&amp;MEC_BUC1_ALP00023</i>	
		Revize/Revision <i>Revizie 0</i>	Strana / Page <i>pagina 15/21</i>

<b>Project</b> <i>Proiect</i>	<b>Bucuresti Vest</b>	<b>Paint system</b> <i>sistem de vopsire</i>	<b>A</b>
<b>Parts of delivery</b> <i>Parti livrate</i>	<b>Chimney - part of external suprafate</b> <i>Cos de fum - suprafete exeterioare</i>		
<b>Surface</b> <i>Suprafata</i>	<b>uninsulated</b> <i>neizolate</i>	<b>location</b> <i>locatie</i>	<b>outdoor</b> <i>exterior</i>
<b>Substrate</b> <i>Material</i>	<b>steel</b> <i>metal</i>	<b>working temperature</b> <i>temperatura de lucru</i>	<b>&lt;230C<sup>1</sup></b>

### Paint system specification/Specificatii sistem de vopsire

Original surface condition  Suprafata initiala	Rust grade <i>Grad rugina</i>		A,B,C (ISO8501-1)		in site
	Surface imperfections <i>Imperfectiunile suprafetei</i>		see It.3.1		
Surface preparation  <i>Pregatirea suprafetei</i>	Preparation grad <i>Grad de pregatire</i>		Sa 2 ½ (ISO 8501-1)		
	Surface profil		Medium (G) (ISO 8503-2)		
	Local damage reparation <i>reparatii locale</i>		P St 3 or P Ma (ISO 8501-2) <sup>2</sup>		
Coat / Paint	Paint <i>Vopsea</i>			NDFT	Application place
<i>Strat/Vopsea</i>	Binder	Pigment	Colour shade <i>Nunanta de culoare</i>		
1st coat/priming <i>primul strat/grund</i>	2K ethyl silicate	Zn	19840 (grey) <i>19840 (gri)</i>	75	in site
touch up <i>finisaj</i>	silicone	Zn	19840 (grey) <i>19840 (gri)</i>	50	
2nd stratul 2 intermediar	silicone-acrylic	miscellaneous amestec	RAL <sup>3</sup>	30	
3rd coat/top stratul 2 final	silicone-acrylic	miscellaneous amestec	RAL <sup>3</sup>	30	
TOTAL NDFT				135	

<b>Coat</b> <i>Strat</i>	<b>1st coat</b> <i>stratul 1</i>	<b>touch up</b> <i>finisaj</i>	<b>2 st coat</b> <i>stratul 2</i>	<b>3 st coat</b> <i>stratul 3</i>
<b>Product*</b> <i>produs</i>	<b>Hempel's Galvosil 15702</b>	<b>Hempel's Silicone Zinc 16900</b>	<b>Hempel's Silicone Acrylic 56940</b>	<b>Hempel's Silicone Acrylic 56940 RAL<sup>3</sup></b>
<b>Practic.spreading</b> <i>consum</i>	<b>4.3 m²/l</b>		<b>5.8 m²/l</b>	<b>5.8 m²/l</b>
<b>Film thickness</b> <i>grosimea stratului</i>	<b>DFT/WFT dry/wet film thickness; this WFT is necessary to achievement specified DFT</b> <i>DFT/WFT uscat / umed grosimea stratului;</i>			
<b>DFT/WFT</b>	<b>75µm / 120µm</b>	<b>50µm / 90µm</b>	<b>30µm / 100µm</b>	<b>30µm / 100µm</b>
<b>min. local</b> <i>grosime minima</i>	<b>60µm</b>		<b>24µm</b>	<b>24µm</b>
<b>max. local</b> <i>grosime maxima</i>	<b>100µm<sup>4</sup></b>		<b>4</b>	<b>4</b>
<b>Recoat interval</b> <i>interval de</i>	<b>hour = h , day = d</b> <i>ore = h , zile = d</i>			
<b>Min. / max</b>			<b>8 h / none (20 C)</b>	



Applications Detalii de aplicare	further information concerning paint application - see material data sheet of this paint informatii suplimentare cu privire la aplicarea vopselei - vezi fisa de material pentru acesta vopsea			
<b>Thinner</b> diluante	08700	08080	08080	08080
<b>Curing agent</b> agent de intarire	97170			
<b>Mixing ratio</b> raport de amestec	11,2 : 3,8 (Vol.)			
<b>Pot life</b>	8h (20 C)			

Application Metoda de aplicatie	x - recommended; 0 - acceptable; n/a - non acceptable x - recomandat; 0 - acceptabil; n/a - neacceptabil			
<b>Airless spray</b> pulverizare airless	X <sub>6</sub>	X	X <sub>7</sub>	X
<b>Air spray</b> pulverizare cu aer compr.	X <sub>6</sub>	X	X <sub>7</sub>	X
<b>Brush</b> aplicare cu pensula	0	0	0	0
Application details Detalii de aplicare				

<b>Application</b> Conditii de aplicare				
<b>Air temperature</b> Temperatura	-10 C ÷ + 40 C			
<b>Relative humidity</b> Umiditatea relativa	min 65%			
<b>Surface</b> Temperatura				
<b>Dew point</b> punct de roua	at least 3 C above the dew point cel puțin 3 C peste temperatura punctului de roua			

Note  
Nota

1) Common working temperature is ca 100 C, top working temp. up to 230 C. thermal endurance of system is 300 C

1) temperatura de lucru este de cca 100 C, temperatura maxima de lucru poate ajunge pana la 230 C, temperatura maxima la care poate rezista este de 300 C

2) Products of Zinc corrosion ("white rust") remove by hard nylon brush and fresh water

2) oxizi de zinc datorati corozioni ("rugina alba") indepartate cu ajutorul periei si a apei

3) On the top part of chimney will be 7 warning red-white stripes (see It. 3.8)

3) in partea superioara a cosului de fum vor alterna 7 straturi de culoare rosu-alb (vezi It.3.8)

4) Too high film thickness results to the risk of paint cracking and peeling

4) Un strat prea gros conduce la riscul craparii vopselei si deshumarea acesteia

5) before application subsequent paint the zinc-silicate must be almost fully cured - verify by MEK test acc. To ASTM D 4752 (grade 5)

5) Inainte de aplicarea vopselei substratul de silicat de zinc (grund) trebuie sa fie aproape complet uscat - se va verifica prin aplicarea testului MEK conform ASTM D 4752 (grad 5)

6) Avoid to "dry spraying" during application

6) evitati aplicarea uscata

7) first apply a "mist coat" to reduce the risk of popping

7) se aplica mai intai un strat diluat pentru a reduce riscul de crapare



Sef sectie Ciclu  
Combinat

Costin ZISU

Sef STMIU

Alexandra  
RADULESCU





## APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

### HEMPEL'S GALVOSIL® 15702

#### Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPEL'S GALVOSIL 15702.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

#### Steel work:

For optimum performance, eg relevant for cargo tank coating, the following is recommended:

All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in weldings seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm. Any laminations must be removed.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:1988.

**Note:** Porous surfaces such as certain types of cast iron cannot be properly protected with zinc silicate. Deeply corroded steel may also be difficult to protect with a zinc silicate.

All steel work (including welding, flamecutting, grinding) must be finished before the surface preparation starts.

#### Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

**Old steel:** Even after a very thorough cleaning, pits may typically contain contamination in the form of remnants of chemicals/water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "chemical bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

Grit blast to min Sa 2½, ISO 8501-1:1988.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1:1988, very near to white metal Sa 2½-Sa 3. In practice, this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows for a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10a, Keane-Tator Surface Comparator, G/S min 3.0 or ISO/DIS 8503/1 rough MEDIUM (G).

#### Issued:

October 2001

**HEMPEL'S GALVOSIL 15702**

When painting undersides, the spray gun will need intermittent cleaning with THINNER 08700 to prevent clogging of the nozzle.

With conventional spray application regulation of the pot and the atomizing air pressures can be made as follows:

1. Shut off the atomizing air.
2. Regulate the pressure in the pot so that the material reaches approximately 60 cm/20" horizontally out from the gun before falling to the ground.
3. Turn on the atomizing air using lowest possible pressure.

**Airless spray equipment:** A large, slow-working pump is preferred, e.g 30:1, with a pump capacity of 8-12 litres/minute. The in-line filter should be 60 mesh.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023".
Fan angle:	40° through 70°.
Nozzle pressure:	100-150 bar (1400-2100 psi).

(Spray data are indicative and subject to adjustment).

Thinning, if required: max. 30% of THINNER 08700.

**Thinning:**

The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, spray equipment, etc.

In the case of a high level of thinning and/or long stops in application, the mixed paint must be recirculated to avoid settlement of zinc particles in the spray hoses.

The coating **must** be wet and smooth just after application. Besides correct spray technique, the amount of thinner added must be selected securing this optimum film formation.

Too little thinning will typically lead to dry-spray and too much thinning to sagging and settling of zinc particles in the can or in the spray hoses.

**Cleaning of equipment:**

The whole equipment must be cleaned thoroughly with THINNER 08700 after use.

Additionally for conventional spray-guns:

In the case of short stops, prevent packing of zinc around the needle by placing the spray gun in THINNER 08700 and let some air pass the spray gun. In the case of longer stops, clean the spray gun with THINNER 08700.

**Mixing:**

- a. Do not open packings until immediately before use. The entire content of the two packings must be used for each batch to ensure a correct mixture. Left-overs in the packings cannot be used later. Protect the ZINC DUST against moisture before mixing.
- b. Before mixing, shake or stir the GALVOSIL 15708 LIQUID very thoroughly.
- c. Pour the ZINC DUST slowly down into the LIQUID with constant mechanical stirring. **Do not mix in the reverse order.** Continue stirring until the mixture is free of lumps.
- d. Strain the mixture through a screen, 60 - 80 mesh (250 - 160 DIN Norm. 4188).

**Pot life:**

8 hours at 20°C/68°F.

**Temperature of paint:**

In a hot climate it is important that the cans with LIQUID are kept out of the sun and that the temperature of the liquid is kept below 30°C/86°F in order to avoid excessive dry spray.

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**HEMPEL'S GALVOSIL 15702**

With temperatures at or below 0°C/32°F beware of ice on the surface, which will hinder the adhesion, and use a capacitive RH-meter for measuring the relative humidity.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent. All surfaces must be ventilated. However, avoid ventilators blowing directly onto the freshly applied paint.

**Drying and curing, ventilation:**

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPEL'S GALVOSIL 15702 gives off in total 160 litres solvent vapour until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 320 m<sup>3</sup> per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

It is recommended to keep the relative humidity low during application and drying. Thereafter, let the relative humidity raise by "natural means", i.e. the dehumidifiers are notched off and normal ventilation used. However, it is recommended to let dehumidifiers run until dry film thicknesses have been checked - and if needed - rectified by an extra paint application.

**Curing time:**

Curing is dependent on (steel) temperatures and relative humidities.

At 20°C/68°F and 65-75% RH, curing requires approximately 3 days. At lower temperatures and relative humidity, curing time will increase considerably. Please contact Hempel for further instructions.

The relative humidity should be minimum 65% - and the minimum temperature -10°C/14°F - during the period of curing. Hosing down of tanks can support curing, but should if possible await the state of "near to complete" curing - please see below.

The coating will resist light showers after 1-2 hours at 20°C/68°F and 75% relative humidity. Curing may be promoted at low humidity by hosing down the surface with water 4 hours after application and keeping the surface constantly wet until curing is complete. If salt water is used, rinse with fresh water if the surface is to be overcoated.

**State of curing:**

Can be checked by rubbing the coating with a rag soaked in THINNER 08700. If the coating remains unaffected, state of curing is sufficient for recoating with other paint materials (when used as a cargo tank coating this state of curing may be described as "near to complete").

**Full curing for cargo loading:**

**Before tanks are taken into use, the coating must be completely through-cured. This is secured by low pressure hosing/washing the tanks with (fresh) water 2-3 times after the above described condition of "near to complete curing" has been obtained. By using the tank washing equipment, the normal ½ hour cycle is applied with half a day to one day between washings. Let the tanks remain wet between the washing.**

**HEMPEL'S GALVOSIL 15702**

One way to reduce the risk of popping is to apply a mist coat as the first pass of the subsequent coat, let the air escape, and then apply the remainder of the topcoat.

Some of HEMPEL's products will substantially reduce the risk of popping when applied directly on top of the zinc silicate. See painting specification.

Advanced paint systems are recommended for topcoating, e.g. HEMPADUR qualities.

**Surface cleaning:**

The cleaning before topcoating depends on the condition of the surface:

1. Intact zinc silicate surface with sporadic formation of "white rust" (zinc corrosion products).
  - a. Remove oil, grease, dirt, etc. by detergent wash.
  - b. Remove "white rust" by high pressure fresh water cleaning 200-350 bar (2900-5000 psi) at a nozzle-to-surface distance of 15-20 cm (6-8").

If the surface is only slightly contaminated, corresponding to 1-2 months of exposure in a mildly corrosive environment, hosing down of the surface with fresh water and scrubbing with stiff brushes (nylon) may be sufficient and more practical. Check that the coating is through dry before recoating.

2. Zinc silicate surface with extreme formation of "white rust" which cannot be removed as described above.
  - a. Remove oil, grease, dirt, etc. by detergent wash.
  - b. Abrasive blast sweep to remove "white rust", followed by vacuum cleaning to remove abrasives and dust.
  - c. Restore the zinc layer with any solvent borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).
3. Damaged areas, burns, weld spatters, etc.
  - a. Remove oil, grease, dirt, etc. by detergent wash.
  - b. Remove weld spatters.
  - c. Abrasive blasting to min. Sa 2½, followed by thorough removal of abrasives and dust by vacuum cleaning.
  - d. Restore the zinc layer with any solvent borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).





Anexa nr.6.

## HEMPEL'S SILICONE ZINC 16900

<b>Description:</b>	HEMPEL'S SILICONE ZINC 16900 is a heat resistant zinc pigmented silicone primer. It is air drying at ambient temperature and resists temperatures up to 400°C/750°F. (See REMARKS overleaf)
<b>Recommended use:</b>	As a primer for long-time corrosion protection of steel exposed to high temperatures (from 100°C/210°F to 400°C/750°F).
<b>Service temperature:</b>	Maximum, dry exposure only: 140°C/284°F
<b>Certificates/Approvals:</b>	Complies with EU Directive 2004/42/EC: subcategory j.
<b>Availability:</b>	Part of Group Assortment. Local availability subject to confirmation.
<b>PHYSICAL CONSTANTS:</b>	
Shade nos/Colours:	19840 / Metal grey
Finish:	Flat
Volume solids, %:	54 ± 1
Theoretical spreading rate:	13.5 m <sup>2</sup> /l [541.4 sq.ft./US gallon] - 40 micron/1.6 mils
Flash point:	25 °C [77 °F]
Specific gravity:	2.5 kg/litre [21.3 lbs/US gallon]
Surface dry:	1 approx. hour(s) 20°C/68°F
Dry to touch:	2 - 3 hour(s) 20°C/68°F
VOC content:	403 g/l [3.3 lbs/US gallon]
	<i>The physical constants stated are nominal data according to the HEMPEL Group's approved formulas.</i>
<b>APPLICATION DETAILS:</b>	
Application method:	Airless spray / Air spray / Brush
Thinner (max.vol.):	08080 (5%) / 08080 (15%) / 08080 (5%)
Nozzle orifice:	0.017 "
Nozzle pressure:	125 bar [1812.5 psi] (Airless spray data are indicative and subject to adjustment)
Cleaning of tools:	HEMPEL'S THINNER 08080
Indicated film thickness, dry:	40 micron [1.6 mils]
Indicated film thickness, wet:	75 micron [3 mils]
Recoat interval, min:	According to specification.
Recoat interval, max:	According to specification.
<b>Safety:</b>	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Safety Data Sheets and follow all local or national safety regulations.



# Hempel's Galvosil 15702

## Product characteristics

**Description**

Hempel's Galvosil 15702 is a two-component, solvent-borne, self-curing, inorganic zinc silicate with outstanding resistance against weathering and abrasion.  
It has excellent chemical resistance within the pH range 6-9. For vice temperature range, see below.  
Applicable by airless spray. Offers cathodic protection of local mechanical damage.  
Hempel's Zinc metal pigment 97170 is in full compliance with ISO 3549 and ASTM D520 type II.

**Recommended use**

As a general purpose, heavy-duty, rust-preventing primer. As a single, complete coating for long-term protection of steel exposed to moderately to severely corrosive environment and to abrasion. As a tank lining in accordance with the CARGO PROTECTION GUIDE.

**Service temperature:**

- Without topcoat: maximum, dry, atmospheric exposure: 400 °C [752°F].
- With a suitable topcoat: maximum, dry, atmospheric exposure: 500°C [932°F], peak: 600 °C [1112°F].
- Wet service temperatures: Please consult the Chemical protection guide at [hempel.com](http://hempel.com).

## Product safety

**Flash point** 26°C [79°F]

**VOC content mixed product**

Legislation	Value
EU	514 g/L [4.29 lb/US gal]
US (coatings)	514 g/L [4.29 lb/US gal]
US (regulatory)	525 g/L [4.38 lb/US gal]
China	514 g/L [4.29 lb/US gal]

According to specific legislation, see details in the Explanatory Notes available at Hempel website, [hempel.com](http://hempel.com) or at your local Hempel website.

**Handling**

Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

## Product data

**Product code**  
15702

**Product components**  
Base 15708  
Zinc 97170

**Standard shade / code**  
Grey 19840

**Gloss**  
Flat

**Volume solids**  
64 ± 2%

**Specific gravity**  
2.7 kg/L [22 lb/US gal]

**Reference dry film thickness**  
50 micron [2.0 mils]



# Hempel's Galvosil 15702

## Surface preparation

### Cleanliness

- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.

### w build:

- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Remove dust, blast media and loose materials.

### Maintenance and Repair

- According to Hempel's Specification.

### Roughness

- Surface profile Medium (G) (ISO 8503-2).

Consult Hempel's separate Surface Preparation Guidelines for more details.

## Application

### Mixing ratio

Base 15708 : Zinc 97170  
(31.5 : 68.5 by weight)

Products containing floating or settling particles/pigments need to be continuously stirred during application. This is especially important in case of heavy thinning. It is recommended to use fixed volumes/can size for multi-component products.

### Thinner

Hempel's Thinner 08700  
Hempel's Accelerator & Thinner 0870M

## Application method

Tool	Thinning max vol.	Application parameters
Airless spray	30%	Nozzle pressure: 100 bar [1500 psi] Nozzle orifice: 0.019-0.023"
Brush	10%	Not Applicable.

To minimise dry spray at high temperatures, extra thinning may be necessary. If brush or roller application is used, more coats will be necessary to achieve the specified dry film thickness. Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

## Film thickness

Specification range	Low	High	Recommended
Dry film thickness	50 micron [2.0 mils]	125 micron [5.0 mils]	50 micron [2.0 mils]
Wet film thickness	78 micron [3.1 mils]	195 micron [7.8 mils]	78 micron [3.1 mils]
Theoretical spreading rate	13 m²/L [530 sq ft/US gal]	5.1 m²/L [208 sq ft/US gal]	13 m²/L [530 sq ft/US gal]

Overthickness must be closely controlled and never locally exceed 125 micron [5.0 mils] DFT. On irregular surfaces it is recommended to employ special care in avoiding over application.

### Relative Humidity:

- Relative humidity must be above 50% during curing.

### Application remarks

- Consult Hempel's Application Guidelines and Instructions for more details.

## Drying and overcoating

### Product compatibility

- Previous coat: None.
- Subsequent coat: According to Hempel's Specification.

# Hempel's Galvosil 15702

## Drying time

Surface temperature		20°C [68°F]	10°C [50°F]	0°C [32°F]
Touch dry	min	30	-	-
Fully cured	hours	16	36	72

Determined for dry film thickness 50 micron [2.0 mils] at standard conditions, see Hempel's Explanatory Notes for details. The drying times of moisture curing products will depend on the relative humidity, therefore drying times in the field could vary.

## Drying conditions

- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.

## Overcoating details

- Remove zinc salts or other contamination before overcoating.
- Flash-coat technique is recommended when overcoating Galvosil qualities.
- Inorganic zinc silicates must be fully cured before overcoating.

## Storage

### Shelf life

Ambient temperature	25°C [77°F]
Base	6 months
Zinc	36 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Storage at elevated temperatures may reduce shelf life. For advice, please consult Hempel.

## Carbon Footprint

Dry film thickness	1 µm	1 mil
GWP (Global Warming Potential)	21.1 g CO <sub>2</sub> e/m <sup>2</sup>	0.11 lb CO <sub>2</sub> e/ft <sup>2</sup>

The carbon footprint is for 1 square meter / square foot of surface area with a dry film thickness of 1 micron / mil.

The scope includes raw materials, in-bound transport to the Hempel factory, Hempel manufacturing processes, and any Volatile Organic Compounds emitted during and after the application of the product.

It is calculated based on the standard shade defined in this PDS. Values may vary with shade.



# Hempel's Galvosil 15702

## Additional documents

Additional information is available at the Hempel website  
<https://www.hempel.com/service-and-support/technical-guidelines>  
or at your local Hempel website:

- Explanatory Notes for Product Data Sheet.
- Application methods.

This Product Data Sheet (PDS) relates to the supplied product ("Product") and is subject to updating from time-to-time. Accordingly, the buyer/applicator should have regard to the PDS supplied together with the relevant batch of the Product (and not an earlier version). In addition to the PDS, the buyer/applicator may receive some or all of the following specifications, statements and/or guidelines as listed below or as are available from the Hempel website under "Products" at [www.hempel.com](http://www.hempel.com) (the "Additional documents").

No.	Document description	Location/comments
1.	Technical Statement	One-off specific advice provided on request for specific projects
2.	Specification	Only issued for specific projects
3.	PDS	This document
4.	Explanatory Notes to the PDS	Available at <a href="http://www.hempel.com">www.hempel.com</a> and contain relevant information about the Product testing parameters
5.	Application instruction	Where available, at <a href="http://www.hempel.com">www.hempel.com</a>
6.	Generic technical guidelines (e.g. on application and surface preparation)	Where available, at <a href="http://www.hempel.com">www.hempel.com</a>

In the event of a conflict of information between the PDS and the Additional documents, the order of priority of information shall be in the order as set out above. In such event you should also contact your representative at Hempel for clarification. Furthermore, the buyer/applicator must have full regard to the relevant Safety Data Sheet provided with each Product and which can also be downloaded from [www.hempel.com](http://www.hempel.com).

Hempel shall not be liable for defects where the application of the Product has not been made fully in accordance with the recommendations and requirements set out in the relevant PDS and the Additional Documents. The information and terms of this disclaimer apply to this PDS, the Additional documents and any other documents supplied by Hempel in respect of the Product. In addition, the Product is supplied and all technical assistance is given subject to Hempel's General Conditions of Sale, Delivery and Service, unless otherwise expressly agreed in writing.

# Hempel's Silicone Acrylic

## Product characteristics

### Description

Hempel's Silicone Acrylic 56940 is a heat resistant acrylic modified polysiloxane paint. It is air drying at ambient temperature.

### Recommended use

For long-term protection of hot pipelines, exhaust pipes, smoke stacks and other hot surfaces up to 200°C/390°F, resists short time exposure up to 300°C/572°F. When heated to above 200°C/390°F for longer periods of time a certain discolouration may occur, which does not affect the protective properties of the product.

### Service temperature:

- Maximum, dry exposure only: 200°C [392°F].
- Aluminium shades: 400°C [752°F].

## Product safety

**Flash point** 25°C [77°F]

### VOC content

Legislation	Value
EU	405 g/L [3.38 lb/US gal]
JS (coatings)	405 g/L [3.38 lb/US gal]
US (regulatory)	405 g/L [3.38 lb/US gal]
China	405 g/L [3.38 lb/US gal]

According to specific legislation, see details in the Explanatory Notes available at Hempel website, [hempel.com](http://hempel.com) or at your local Hempel website.

### Handling

Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

## Product data

### Product code

56940

### Standard shade / code

Light grey 11150 \*

### Gloss

Semi-flat

### Volume solids

54 ± 2%

### Specific gravity

1.4 kg/L [11 lb/US gal]

### Reference dry film thickness

25 micron [1.0 mils]

### Aluminium shade / code

Aluminium grey 19000 \*\*

### Gloss

Please consult Hempel's Guideline on aluminium pigmented coatings.

### Volume solids

29 ± 2%

### Specific gravity

1.1 kg/L [9 lb/US gal]

### Reference dry film thickness

25 micron [1.0 mils]

\* Colour stability may be affected by exposure to harsh chemical and/or high temperatures.

\*\* Appearance of the aluminium pigmented coats will depend on application method, drying conditions, handling etc. Please see the Guideline on Aluminium pigmented coatings at [hempel.com](http://hempel.com) or at your local Hempel website.



# Hempel's Silicone Acrylic

## Surface preparation

### Cleanliness

- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.

### Build:

- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Remove dust, blast media and loose materials.

### Maintenance and Repair

- Spot abrasive blasting to min. PSa 2½ (ISO 8501-2) / SP 10 (SSPC).
- Remove dust, blast media and loose materials.

Consult Hempel's separate Surface Preparation Guidelines for more details.

## Application

### Mixing ratio

Stir well before use.

### Thinner

Hempel's Thinner 08080

### Cleaner

Hempel's Thinner 08080

### Application method

Tool	Thinning max vol.	Application parameters
Airless spray	15%	Nozzle pressure: 125 bar [1800 psi] Nozzle orifice: 0.017"
Air spray	25%	Not Applicable.
Brush	15%	Not Applicable.

If brush or roller application is used, more coats will be necessary to achieve the specified dry film thickness. Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

### Film thickness

Specification range	Low	High	Recommended
Dry film thickness	25 micron [1.0 mils]	50 micron [2.0 mils]	25 micron [1.0 mils]
Wet film thickness	46 micron [1.9 mils]	93 micron [3.7 mils]	46 micron [1.9 mils]
Theoretical spreading rate	22 m²/L [896 sq ft/US gal]	11 m²/L [448 sq ft/US gal]	22 m²/L [896 sq ft/US gal]

Product may be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate, drying and curing time and overcoating interval. For best performance, avoid excessive film thickness.

### Application conditions

- To avoid condensation, apply on a clean and dry surface with a temperature that is at least 3°C [5°F] above the dew point.
- Surface temperature must be above 10°C [50°F] during application and curing.
- Can be applied onto hot substrate up to maximum 40°C [104°F].
- For application and curing at other conditions, please contact your local Hempel representative.

### Application remarks

- Two coats of the topcoat may be necessary to obtain full hiding power.

## Drying and overcoating

### Product compatibility

- Previous coat: According to Hempel's Specification. Recommended products are: Hempel's Silicone Zinc 16900, Hempel's Galvosil 15700, Hempel's Silicone Aluminium 56914
- Subsequent coat: None.

# Hempel's Silicone Acrylic

## Drying time

Surface temperature		20°C [68°F]
Touch dry	min	15
Hard dry	min	30

Determined for dry film thickness 25 micron [1.0 mils] at standard conditions, see Hempel's Explanatory Notes for details.

## Drying conditions

- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.
- Condensation on the freshly applied coating should be avoided.

## Overcoating details

- The surface must be dry and clean prior to application.

## Other remarks

- Hempel's Specification supersedes any recommendations given in the Product Data Sheets.

## Storage

### Shelf life

Ambient temperature	25°C [77°F]
Product	24 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Storage at elevated temperatures may reduce shelf life. For advice, please consult Hempel.

### Storage conditions

- Product must be stored according to local legislation, at maximum 40°C [104°F], without direct sunlight and protected from rain and snow.

## Carbon Footprint

Dry film thickness	1 µm	1 mil
GWP (Global Warming Potential)	11.2 g CO <sub>2</sub> e/m <sup>2</sup>	0.058 lb CO <sub>2</sub> e/ft <sup>2</sup>

The carbon footprint is for 1 square meter / square foot of surface area with a dry film thickness of 1 micron / mil.

The scope includes raw materials, in-bound transport to the Hempel factory, Hempel manufacturing processes, and any Volatile Organic Compounds emitted during and after the application of the product.

It is calculated based on the standard shade defined in this PDS. Values may vary with shade.



# Hempel's Silicone Acrylic

## Additional documents

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- Explanatory Notes for Product Data Sheet.
- Application methods.
- General Application Guidelines

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