SUMMARY of SAFETY and CLINICAL PERFORMANCE

SSCP

CEMFIX®

Document: SSCP_CEMFIX_V1.2
Dated: AUG 2023

Prepared by	**Date**	**Signature**
Name: S. Van de Moortele Function: **Clinical Research Manager** *PRRC for PMS*		

Approved by	**Date**	**Signature**
Name: F. Marcq Function: **R&D Manager**		
Name: S. Salles Function: **Regulatory Affairs Manager** *PRRC for Technical file and EU DoC*		
Name: F. Druilhet Function: **Quality Manager** *PRRC for QMS and Materiovigilance*		

SUMMARY of SAFETY and CLINICAL PERFORMANCE (SSCP) for HEALTH CARE PROFESSIONALS CEMFIX®

Foreword

This Summary of Safety and Clinical Performance (SSCP) is intended to provide public access to an updated summary of main aspects of the safety and clinical performance of the device.

The SSCP is not intended to replace the Instructions For Use as the main document to ensure the safe use of the device, nor intended to provide diagnostic or therapeutic suggestions to intended users or patients

The following information is mainly intended to users (health care professionals such as surgeons). A summary intended for patients can be found at the end.

1. Device Identification and general information

1.1. Device Trade Name(s): **CEMFIX® 1, CEMFIX® 3**

The medical devices have also the following private labels:
AMPLIFIX 1 / AMPLIFIX 3; BIOCEMIUM I / BIOCEMIUM III; IMPLABOND 1 / IMPLABOND 3; OPTICEM 1 / OPTICEM 3; ORCEM 1 / ORCEM 3; PALAFOM 1/ PALAFOM 3; SINPLUS 1 / SINPLUS 3; ORTHOCEM 1 / ORTHOCEM 3 ; EVOCEM 1 ET EVOCEM 3; NexCem 1 / NexCem 3 /; SIGNATURE Cement SV / SIGNATURE Cement LV / SIGNATURE -x Cement MV ; ProstheSet 13 / ProstheSet 14; PERFIX PLUS 1 / PERFIX PLUS 3; Synth-X OH / Synth-X OL ; BezCem® 1 / BezCem® 3; CM-PX 1 / CM-PX 3; DYNABONE 1 / DYNABONE 3 /; TEKCEM 1 / TEKCEM 3; C-fix 1 / C-fix 3; ArthroCem 1 / ArthroCem 3; Jointfix 1 / Jointfix 3; Prosthefix 1 / Prosthefix 3; C-Cem 1 / C-Cem 3.

1.2. Manufacturer name and address(es):

TEKNIMED S.A.S.		
Headquarters 8, rue du Corps Franc-Pommiès 65500 Vic en Bigorre France	*Production and facilities* 11-12, rue d'Apollo ZI de Montredon 31240 L'Union France	*Distribution site (labelling)* ZI de la Herray 65500 Vic en Bigorre France

1.3. Manufacturer's SRN (Single Registration Number): **FR-MF-000001224**

1.4. Basic UDI-DI: **376017704B18DB**

1.5. Medical device nomenclature description: **EMDN nomenclature: P099001 - orthopaedic cements**

1.6. Class of device: **IIb**

1.7. Year when the first certificate (CE) was issued covering the device: **1998**

The medical device has been introduced for the first time in the following countries:

Country	Year of introduction
Europe	1998
BRAZIL	2006
RUSSIA	2006
THAILAND	2006
COLOMBIA	2007
EGYPT	2011
INDIA	2016
MOROCCO	2006
BELARUS	2015
PHILIPPINES	2014

SERBIA	2013
COSTA RICA	2014
SUDAN	2015
CHINA	2015
UKRAINE	2016
VENEZUELA	2016
INDONESIA	2016
URUGUAY	2016
VIETNAM	2016
MACEDONIA	2017
LEBANON	2018
IRAN	2019
SAUDI ARABIA	2019
MONTENEGRO	2019
ECUADOR	2019
MALAYSIA	2020
UNITED ARAB EMIRATES	2020
GUATEMALA	2020
BOSNIA	2021
ARGENTINA	2022
SOUTH AFRICA	2022
BANGLADESH	2022
DOMINICAN REPUBLIC	2022
ZIMBABWE	2022
PAKISTAN	2022

1.8. CE Certificate Number (under MDD): **CE 646667**

1.9. Authorised representative if applicable; name and SRN: **NA as the manufacturer is located in the EU.**

1.10. NB's name (the NB that will validate the SSCP) and single identification number: **BSI Netherlands (CE 2797).**

2. Intended use of the device

2.1. Intended purpose

CEMFIX® bone cements are intended for fixation of prosthetic components into bone medullar cavity in arthroplasty procedures.

2.2. Indication(s) and target population(s)

- *Indications*

CEMFIX® bone cements are indicated for use in cemented arthroplasty procedures.

- *Target population*

CEMFIX® bone cements are to be used in adult patients for whom a cemented arthroplasty surgery is indicated.

2.3. Contraindications or restriction for use

- Procedures other than those stated in the INDICATIONS section.
- Metabolic disorders
- Use in the presence of an active or incompletely treated infection at the bone site.
- Hypersensitivity to constituents of the bone cement.
- Due to non-sufficient available clinical evidence, CEMFIX® bone cements are contraindicated in paediatric, adolescent, and skeletally immature patients, and pregnant or breast-feeding women.

3. Device description

3.1. Description of the device

CEMFIX® 1 & 3, are surgical cements manufactured in compliance with ISO 5833 standards (Implants for surgery -- Acrylic resin cements). Their self-curing specifications allow an immediate and stable fixation of surgical implants into the bone during orthopaedic surgery.

CEMFIX® cements, like all acrylic bone cements, are presented as a powder (in a pouch) and a liquid (in an ampoule) which must be mixed extemporaneously, during the surgery.



Figure 1: CEMFIX® cement

COMPOSITION	Concentration (% w/w)	
	CEMFIX®1 High viscosity	**CEMFIX®3** Low viscosity
Powder phase	40g	40g
Polymethyl-methacrylate	87.6	87.6
Benzoyl peroxide	2.4	2.4
Barium sulphate	10.0	10.0
Liquid phase	14.4g	16.4g
Methyl-methacrylate	84.4	84.4
N-Butyl-methacrylate	13.2	13.2
N,N-Dimethyl-p-toluidine	2.4	2.4
Hydroquinone	20ppm	20ppm

- *Principles of operation of the device and mode of action*

Each unit of bone cement consists of a polymeric powder component and a monomeric liquid component. The powder contains benzoyl peroxide (BPO) and the liquid contains N, N-dimethyl-ρ-toluidine (DMPT). When the liquid is added to the powder and mixed in accordance to the instructions for use, a cement of a given consistency depending on formulation is formed. The BPO from the powder and DMPT from the liquid react to generate free radicals by means of a redox reaction. The free radicals react with the monomeric liquid causing polymerisation and hardening of the cement. The surgeon applies the cement either digitally or by a syringe applicator, inserting the prosthesis into the cement when it is in a doughy state. The cement dough polymerises exothermally in-situ and secures the prosthesis in place.

The CEMFIX surgical cements are then used for securing a metallic or polymeric prosthesis to living bone in arthroplasty procedures. The bone cements have no intrinsic adhesive properties, but rely instead on close mechanical interlock between the irregular bone surface and the prosthesis.

- *Lifetime*

CEMFIX® bone cements have an expected survival rate of 90% at 10 years. At the end of this expected lifetime, the cement does not need to be removed and does not need any maintenance, unless a medical complication would require a new surgery.

3.2. Reference to previous generation(s) or variants if such exist, and a description of the differences

CEMFIX® bone cements are not issued from any previous generation.

Teknimed range of CEMFIX® cements comprises 2 variants: CEMFIX®1, CEMFIX®3.

- CEMFIX®1: high viscosity bone cement, recommended for manual applications.

- CEMFIX®3: low viscosity bone cement recommended for application with a syringe or an injection gun.

3.3. Description of any accessories which are intended to be used in combination with the device

No accessories are intended to be used with the bone cements.

3.4. Description of any other device or products which are intended to be used in combination with the device

Bone cements are intended to be used in combination with a bone cement restrictor, such as Teknimed CEMSTOP®. CEMSTOP® bioabsorbable cement restrictor is a diaphyseal plug for orthopaedic use. It is designed to occlude the medullary cavity before the introduction of acrylic cement during hip joint replacement.

Bone cements are intended to be prepared with mixing and injection systems adapted to their viscosity:

- For CEMFIX®1 (high viscosity), preparation with bowl and spatula and manual application are recommended.
- For CEMFIX®3 (low viscosity), use of a mixing and injection system is recommended.

4. Risks and warnings

4.1. Residual risks and undesirable side effects

After mitigation as far as possible of identified and expected risks, residual risks include:

- Adverse reactions affecting the cardiovascular system reported in the scientific literature[1] (also known as Bone Cement Implantation Syndrome), such as transitory hypotensive reactions probably due to the risk of MMA monomer release during polymerisation and exposure to monomer fumes. Some patients have progressed to cardiac arrest (up to 0.17% reported in traumatology and 0.017% reported in scheduled procedures)[2]. For this reason, patients should be monitored carefully for any change in blood pressure during and immediately following the application of bone cement. The anaesthetist should be told during the operation when the bone cement is implanted. Incidences of severe BCIS of 5% for primary total knee or total hip arthroplasty, 2% for primary total shoulder arthroplasty and 7% for revision procedure whatever the joint have been reported in the literature on bone cements[3], but none with CEMFIX® cements.
- Excessive exothermic reaction (1 case reported for CEMFIX®1, representing an occurrence of 0.0009 %)
- Postoperative infection (2 cases reported in a clinical study with CEMFIX® cements).
- Inadequate fixation may affect the cement/bone interface and lead to micromotion, issuing in a loosening of the prosthesis (no case reported with CEMFIX® cements). Long-term regular supervision is therefore recommended for all patients.

Any serious incident occurring in relation to the CEMFIX® cements must be reported without delay to TEKNIMED and the competent local authority where the user and/or the patient is established.

4.2. Warnings and Precautions

Read instructions for use carefully prior to use and follow preparation and handling instructions of the cement and its injection system carefully.
Ignoring the instructions for use may lead to potential undesirable effects.
For an optimum use of the cement, it is essential to perform a thorough pre-operative review of the patient before the intervention in order to confirm the indication and plan the surgical technique.
The healthcare professional must be familiar with cement properties and handling characteristics, and experienced in cemented arthroplasty procedures. It is therefore advisable to respect the recommended preparations times.
Pre-clinical testing has been performed on one unit of cement, so it is not recommended to use more than one unit of cement per patient.

[1] Donaldson AJ, Thomson HE, Harper NJ, Kenny NW, *2009. Bone cement implantation syndrome.* Br J Anaesth. 102(1):12-22. doi: 10.1093/bja/aen328

[2] Bonfait H, Delaunay C, De Thomasson E, Tracol P, 2021. *Bone cement implantation syndrome in hip arthroplasty: Frequency, severity and prevention*. Orthop Traumatol Surg Res. 108(2):103139. doi: 10.1016/j.otsr.2021.103139

[3] Rassir R, Schuiling M, Sierevelt I.N, van der Hoeven C.W.P., Nolte P.A. 2021. *What are the frequency, related mortality, and factors associated with Bone Cement Implantation Syndrome in arthroplasty surgery*? Clin Orthop Relat Res 479:755-76. Doi: 10.1097/CORR.0000000000001541

Conservation

- It is strictly forbidden to re-sterilise the product. This product is supplied sterile unless package has been opened or damaged.
- This device is packaged and sterilised for single use only. Do not reuse, reprocess or resterilise. Reuse, reprocessing, or resterilisation may compromise the structural integrity of the device and/or lead to device failure which may result in patient injury or illness. Also, reprocessing or resterilisation of single use devices may create a risk of contamination and/or cause patient infection or cross-infection, including, but not limited to, the transmission of infectious disease(s) from one patient to another.
- Before use, check the protective wrapping carefully to ensure that it has not been opened nor damaged in a way that could affect its sterility.
- Do not use this product after the expiration date printed on the package.

Before use

- Examine the product visually to identify any defects such as crack or deformation. Do not implant products with defects.
- When removing the product from its wrapping, be sure to follow asepsis rules.
- If packaging is unintentionally opened before use or damaged, do not use the product.
- Always check the condition of the liquid before carrying out the procedure. Do not use the liquid component if it shows any sign of thickening or premature polymerization. These conditions indicate that the product has not been stored correctly.

Cement preparation

- For controlled and optimal use of the cement, the doses are to be stored at the recommended temperature of 20°C for a minimum of 24 hours before use.
- The duration of the cement working phases depends on the ambient temperature and those of the components, but also on the degree of relative humidity of the operating room. A high temperature reduces waiting, injection and hardening time. A low temperature extends these times.
- Prechilling of bone cement and accessories for at least 24 hours is recommended if a lower viscosity or a prolonged handling time is required. Mixing time is the same as for non-prechilled cement, however application time and hardening time are prolonged.
- The application phases of CEMFIX®3 have been determined using injection systems recommended by TEKNIMED (Cf. RECOMMENDED ACCESSORIES section above) without vacuum. They may vary if different systems are used. Setting time can be reduced if mixing is performed under vacuum.
- Mixing of two units of bone cement together is not recommended as handling and hardening times can significantly differ from those validated by manufacturer.
- Additives (such as liquid antibiotics) are not to be mixed with the bone cement, as this will alter cement properties.
- Prior to the application of bone cement to the bone, the cavity should be thoroughly cleaned, washed and dried to prevent contamination by blood or marrow.
- The manufacturer does not recommend any surgical technique in particular: it is the responsibility of the physician to determine the appropriateness of the bone cement and specific technique for each patient.

Personnel safety

- The liquid component is a powerful lipid solvent. Do not allow the liquid to come into contact with rubber or latex gloves. Should contact occur, the gloves might dissolve and tissue damage may occur. Wearing a second pair of gloves may diminish the possibility of hypersensitivity reactions.
- The liquid monomer is highly volatile and flammable.
- Make sure the operating room is properly ventilated to eliminate monomer fumes as much as possible.
- Make sure electrocautery devices are not used near freshly implanted bone cements as that could cause the ignition of monomer fumes.
- Caution should be exercised to prevent excessive exposure to the concentrated fumes of the monomer, which may cause drowsiness, irritate the respiratory tract, eyes and even the liver.
- Do not allow personnel wearing contact lenses to be near or be involved in mixing of the bone cement.

Monitoring during application

- The final polymerization stage occurs in situ and is an exothermic reaction with considerable liberation of heat. According to ISO 5833 standard, the temperature can reach up to 95°C. The heat produced in situ during polymerisation can lead in rare cases to modification of structure of the bone[2].
- Maintain the positioning of the prosthetic component until the polymerization process has been completed, so as to obtain proper fixation.

4.3. Other relevant aspect of safety, including a summary of any field safety corrective action (FSCA) if applicable

NA. No FSCA concerning CEMFIX® were issued during the last 5 years.

5. Summary of clinical evaluation and relevant information on post-market clinical follow-up (PMCF)

5.1. Summary of clinical data related to equivalent device, if applicable

At the time of its first CE-marking in 1998, CEMFIX® bone cements were assessed and endorsed by the Notified Body (SNCH) on the basis of their equivalence with CMW® bone cements, manufactured by Depuy Inc. Since the EU MDR 2017/745 entry in force in 2021, no equivalence with other bone cements is claimed anymore.

5.2. Summary of clinical data from conducted investigations of the device before the CE-marking, if applicable

NA. No clinical investigations have been conducted before the CE-marking.

5.3. Summary of clinical data from other sources, if applicable

A. PMCF study initiated in 2019 and still currently conducted by Teknimed

Title: Safety and Clinical Performance Assessment of Bone Cements and Cement Restrictor used in Arthroplasty

Justification/Context: TEKNIMED has developed several bone cements currently used in arthroplasty procedures. With the increasing volume of these procedures, there is a need for real-life long-term safety and efficacy data on these products.

Objective: The objective is to collect immediate, medium and long-term data after arthroplasty surgery, on the related clinical functional and complications outcomes of market-approved TEKNIMED arthroplasty products to assess their performance and safety in a real-world setting.

Study design: global, single arm, non-controlled, multi-centric, ambispective observational study. Patients are followed as per local standard medical practices of the investigational sites. Data are collected pre-operatively, at surgery and at standard of care follow-up (FU) visits.

Primary endpoint: (i) Prosthesis survival defined as time from implantation to revision surgery due to a cement failure; (ii) In the case of cements with gentamicin, superficial and/or deep postoperative infection rate.

Performance endpoints: (i) clinical endpoints: evaluation of pain, patients' satisfaction, joints functional scores; (ii) radiological endpoints: Sedel score, quality of the cement mantle, prostheses stability, implant migration, radiolucent lines

Safety endpoints: All adverse events (such as prosthesis loosening, dislocation, deep infection …) are collected and documented during the study and categorized as whether they are serious and whether they are related to the TEKNIMED device.

Statistical Analysis: Statistical analyses are primarily descriptive as no hypotheses are enunciated to be demonstrated. Each outcome is reported for each product separately, however, some products may be grouped and summarized if the products are related and if needed (e.g. cement + injection system). There are no intentions to compare or test data across products unless requested for a publication or other clinical evidence need. When needed, Kaplan-Meier survivorship analyses will be performed for several endpoints such as implant revision or aseptic loosening.

PMCF Study Outcomes (interim analysis performed in December 2022)

Population: A series of 92 patients, 66 women and 26 men, of which 71 patients with CEMFIX®1 (mean age 71.2 ±8.1 year) and 21 patients with CEMFIX®3 (mean age 83.4 ±19.7 years) were included and their data analysed in a first interim analysis. Patients in the CEMFIX®1 cohort were evaluated at ST-FU visit (n=64, 4.55 ±4.16 months), MT-FU visit (n=40, 24.83 ±8.72 months) and LT-FU visit (n=12, 40.5 ±15.9 months). Patients in the CEMFIX®3 cohort were evaluated at ST-FU visit (n=19, 6.42 ±4.45 month), MT-FU visit (n=13, 22.62 ±9.9 months) and LT-FU visit (n=5, 54.75 ±20.34 months)

Indications and procedures: Main indication was primary knee surgery due to osteoarthritis (n=59, 64%) for the CEMFIX®1 cohort and primary hip surgery due to trauma (n=11, 52.4%) for CEMFIX®3 cohort.
During the surgery procedure, no adverse events or complications related to CEMFIX® cements or associated instrumentation were reported.

Clinical outcomes: In both cohorts (hip and knee), whatever the cement, pain clearly improved, with a decrease of 5/10 points, as soon as the ST-FU. In parallel, a decrease of antalgic consumption and/or a decrease of the grade of consumed antalgic was observed. Likewise, for both cements and joints, subjects' well-being improved at ST-FU by a minimum mean of 5/10 points, and remained stable. At MT-FU visit, more than 90% of subjects were satisfied with their surgery and considered that their health status had improved or remained stable. Most of them would accept this intervention again. A good cement mantle and cement integration were observed on all (100%) radiographic images, whatever the cement used.

Safety: No radiolucent lines nor any osteolytic zones were observed in either cohort.
2 serious adverse events were reported: 2 infections which required revision surgery with component change. Considering the overall cohort and whatever the reason for revision, the survival rate for the CEMFIX®1 cohort is 98.6% at 40.5 ±15.59 months and the survival rate for the CEMFIX®3 cohort is 95.2% at 54.75 ±20.34 months.

Conclusion: To conclude, this interim analysis demonstrates that CEMFIX®1 & 3 are effective and safe bone cements, relevant to be used in arthroplasty surgery.

B. Continuous post-market surveillance (PMS)

During the 5 years period from OCT 2017 to SEP 2022, no complaints with a patient impact involving CEMFIX®3 were recorded. Only 1 complaint with a patient impact has been reported for CEMFIX®1: 1 patient died during an arthroplasty surgery (occurrence rate = 0.0009 %). The patient presented with a general poor health condition (essential hypertension, arrhythmic heart rate, 83 years old). The death wasn't related to the cement.

No materiovigilance reports or batch recalls were registered for competing products in the main public materiovigilance online databases during the same period.

No trends for device malfunction leading to patient harm and no new risks were identified during this 5-year period. The rate of complaints in proportion to the number of sold units for the same period is significantly low and confirms the expected long-term safety of the device.

5.4. Overall summary of the clinical performance and safety

CEMFIX® cements are products issued from a well-known technology which has been used in orthopaedic surgeries for more than 50 years. It allows successful fixation of prosthetic implants into living bone cavity, leading to clinical benefits for the patients such as pain alleviation and improvement in quality of life.
Performance of CEMFIX® cements has been verified and confirmed by a PMCF study (Cf. section 5.3.A. above).
Short-term safety has been verified and confirmed by a PMCF study (Cf. section 5.3.A. above) and long-term safety has been verified and confirmed by a 20-year long post-market surveillance (Cf. section 5.3.B. above).

A literature review demonstrated the very long usage, for more than 50 years, of PMMA cements and antibiotic-loaded bone cements in primary and revision arthroplasty procedures, and confirmed that they can be considered as efficient and safe well-known technologies. Post-market surveillance showed that no new and/or unexpected risks were identified during the last 10 years, in any relevant European Member State. Benefits-risks analysis demonstrated that all claims are supported by benefices responding to quantified benchmark criteria. The benefits-risks ratio of a cemented arthroplasty using CEMFIX® bone cements for the patients can safely be considered positive.

5.5. On-going or planned post-market clinical follow-up

The PMCF study described in section 5.3.B. above is on-going and continues to be currently conducted by Teknimed.

6. Possible diagnostic or therapeutic alternatives

Once the indication for an arthroplasty procedure has been clearly identified and the patient has agreed to be operated on, the surgeon will have to choose between 2 types of prostheses: cemented and uncemented.

No significant difference in the benefit-risk balance for these 2 types of prostheses have been clearly demonstrated in the medical literature. Their respective benefits and risks are still controversial. Consequently, the type of prosthesis used will usually be decided upon by the surgeon, based on the patient age, lifestyle, and the surgeon's past experience.

7. Suggested profile and training for users

Implantation of TEKNIMED products should only be performed in an adapted environment and by qualified operators having a sound knowledge and full mastery in bone cements preparation techniques. No specific training is required to use Teknimed bone cements as the technique of mixing and injecting bone cements is considered basic knowledge for orthopaedic surgeons. However, if needed, preparation techniques can be acquired from the distributors qualified by TEKNIMED.

8. Reference to any harmonized standards and CS applied

Standard reference	Standard revision	Standard title	Applicability
> General standards			
EN ISO 13485	2016/A11: 2021	Medical devices - Quality management systems - Requirements for regulatory purposes	Fully whenever applicable
EN ISO 14630	2012	Non-active surgical implants - General requirements	Fully whenever applicable
EN ISO 14971	2019 / A11: 2021	Medical devices - Application of risk management to medical devices	Fully whenever applicable
EN 62366	2015 / A1: 2020	Medical devices – Application of usability engineering to medical devices	Fully whenever applicable
XP S99-223	2020	Medical Device – Benefit / Risk management	Fully whenever applicable
EN ISO 14155	2020	Clinical investigation of medical devices for human subjects — Good clinical practice	Fully whenever applicable
> Product standards			
ISO 5833	2002	Implants for surgery — Acrylic resin cements	Fully whenever applicable
ASTM D638	2022	Standard Test Method for Tensile Properties of Plastics	Fully whenever applicable
ASTM F2503	2020	Standard Practice for Marking Medical Devices and other items for safety in the Magnetic Resonnance Environment	Fully whenever applicable
ISO 2859-1	1999 / A1: 2011	Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection	Fully whenever applicable
ASTM F451	2021	Standard Specification for Acrylic Bone Cement	Fully whenever applicable
> Biocompatibility standards			
EN ISO 10993-1	2020	Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process	Fully whenever applicable
EN ISO 10993-2	2006	Biological evaluation of medical devices — Part 2: Animal welfare requirements	Fully whenever applicable
EN ISO 10993-5	2009	Biological evaluation of medical devices — Part 5: Tests for in vitro cytotoxicity	Fully whenever applicable

EN ISO 10993-6	2016	Biological evaluation of medical devices — Part 6: Tests for local effects after implantation	Fully whenever applicable
EN ISO 10993-10	2021	Biological evaluation of medical devices — Part 10: Tests for irritation and skin sensitization	Fully whenever applicable
EN ISO 10993-11	2018	Biological evaluation of medical devices — Part 11: Tests for systemic toxicity	Fully whenever applicable
EN ISO 10993-12	2021	Biological evaluation of medical devices — Part 12: Sample preparation and reference materials	Fully whenever applicable
EN ISO 10993-17	2009	Biological evaluation of medical devices — Part 17: Establishment of allowable limits for leachable substances	Fully whenever applicable
ISO 10993-18	2020/A1: 2022	Biological evaluation of medical devices — Part 18: Chemical characterization of materials	Fully whenever applicable

> Labelling and packaging standards

EN ISO 14698-1	2003	Cleanrooms and associated controlled environments — Biocontamination control — Part 1: General principles and methods	Fully whenever applicable
EN 556-1	2001 / AC:2006	Sterilization of medical devices. Requirements for medical devices to be designated "STERILE". Part 1 : requirements for terminally sterilized medical devices	Fully whenever applicable
EN 556-2	2015	Sterilization of medical devices — Requirements for medical devices to be designated "STERILE" — Part 2: Requirements for aseptically processed medical devices	Fully whenever applicable
EN 868-5	2018	Packaging for terminally sterilized medical devices — Part 5: Sealable pouches and reels of porous materials and plastic film construction — Requirements and test methods	Fully whenever applicable
EN 868-7	2017	Packaging for terminally sterilized medical devices — Part 7: Adhesive coated paper for low temperature sterilization processes — Requirements and test methods	Fully whenever applicable
EN ISO 11607-1	2020	Packaging for terminally sterilized medical devices — Part 1: Requirements for materials, sterile barrier systems and packaging systems — Amendment 1	Fully whenever applicable
EN ISO 11607-2	2020	Packaging for terminally sterilized medical devices — Part 2: Validation requirements for forming, sealing and assembly processes — Amendment 1	Fully whenever applicable
EN ISO 15223-1	2021	Medical devices. Symbols to be used with medical device labels, labelling and information to be supplied. General requirements	Fully whenever applicable
EN ISO 20417	2021/COR: 2021-12	Medical devices — Information to be provided by the manufacturer	Fully whenever applicable
ASTM D 4169	2022	Standard Practice for Performance Testing of Shipping Containers and Systems	Fully whenever applicable
ASTM D 4332	2022	Standard Practice for Conditioning Containers, Packages, or Packaging Components for Testing	Fully whenever applicable
ASTM D 4728	2017	Standard Test Method for Random Vibration Testing of Shipping Containers	Fully whenever applicable
ASTM D 5276	2019	Standard Test Method for Drop Test of Loaded Containers by Free Fall	Fully whenever applicable
ASTM D 999	2008	Standard Test Methods for Vibration Testing of Shipping Containers	Fully whenever applicable
ASTM F 1929	2015	Standard Test Method for Detecting Seal Leaks in Porous Medical Packaging by Dye Penetration	Fully whenever applicable
ASTM F1886/F1886M	2016	Standard Test Method for Determining Integrity of Seals for Flexible Packaging	Fully whenever applicable
ASTM F88 / F88M	2021	Standard test method for seal strength of flexible barrier materials	Fully whenever applicable

ASTM D 6653/ D 6653 M	2021	Standard Test Methods for Determining the Effects of High Altitude on Packaging Systems by Vacuum Method	Fully whenever applicable
ASTM D642	2020	Standard Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads 1	Fully whenever applicable

> Microbiology standards

EN ISO 11737-1	2018 / A1: 2021	Sterilization of medical devices — Microbiological methods - Part 1: Determination of a population of microorganisms on products	Fully whenever applicable
EN ISO 11737-2	2020	Sterilization of medical devices — Microbiological methods - Part 2: Tests of sterility performed in the definition, validation and maintenance of a sterilization process	Fully whenever applicable
EN ISO 11138-1	2017	Sterilization of health care products — Biological indicators - Part 1: General requirements	Fully whenever applicable
EN ISO 11138-2	2017	Sterilization of health care products — Biological indicators — Part 2: Biological indicators for ethylene oxide sterilization processes	Fully whenever applicable

> Gamma sterilisation standards

EN ISO 11137-1	2015 / A2:2019	Sterilization of health care products — Radiation - Part 1: Requirements for development, validation and routine control of a sterilization process for medical devices	Fully whenever applicable
EN ISO 11137-2	2015	Sterilization of health care products — Radiation - Part 2: Establishing the sterilization dose	Fully whenever applicable

> Ethylene oxide sterilisation standards

EN ISO 11135-1	2014 / A1:2019	Sterilization of health care products — Ethylene oxide — Part 1: Requirements for development, validation and routine control of a sterilization process for medical devices	Fully whenever applicable
EN ISO 10993-7	2008 AC1: 2009	Biological evaluation of medical devices — Part 7: Ethylene oxide sterilization residuals	Fully whenever applicable

> Aseptic processing standards

EN ISO 13408-1	2015	Aseptic processing of health care products — Part 1: General requirements	Fully whenever applicable
EN ISO 13408-2	2018	Aseptic processing of health care products — Part 2: Filtration	Fully whenever applicable

9. Revision history

Revision number	Date issued	Change description	Revision validated by the Notified Body
1.0	DEC 2022	Creation	☐ Yes, validation language: English ☑ No
1.1	MAR 2023	§ 1.7. & 1.8.: Correction of the date of first CE mark and number	☐ Yes, validation language: English ☑ No
1.2	AUG 2023	§ 3.: Addition of lifetime § 4.2.: Addition of a mention to use no more than 1 unit of cement per patient § 8. Addition of ASTM F451	☑ Yes, validation language: English ☐ No

A summary of the safety and clinical performance of the device, intended for patients, is provided on next page.

SUMMARY of SAFETY and CLINICAL PERFORMANCE (SSCP) for PATIENTS - English Version
CEMFIX®

This Summary of Safety and Clinical Performance (SSCP) is intended to provide public access to an updated summary of the main aspects of the safety and clinical performance of the device. The information presented below is intended for patients or lay persons. A more extensive summary of its safety and clinical performance prepared for healthcare professionals is found in the first part of this document.

The SSCP is not intended to give general advice on the treatment of a medical condition. Please contact your healthcare professional in case you have questions about your medical condition or about the use of the device in your situation. This SSCP is not intended to replace an implant card or the Instructions For Use to provide information on the safe use of the device.

1. Device Identification and general information

1.1. Device Trade Name: CEMFIX®

2 different CEMFIX® bone cements exist, with 2 different viscosities: CEMFIX®1 and CEMFIX®3.

The medical device has also the following private labels:
AMPLIFIX 1 / AMPLIFIX 3; BIOCEMIUM I / BIOCEMIUM III; IMPLABOND 1 / IMPLABOND 3; OPTICEM 1 / OPTICEM 3; ORCEM 1 / ORCEM 3; PALAFOM 1/ PALAFOM 3; SINPLUS 1 / SINPLUS 3; ORTHOCEM 1 / ORTHOCEM 3 ; EVOCEM 1 ET EVOCEM 3; NexCem 1 / NexCem 3 /; SIGNATURE Cement SV / SIGNATURE Cement LV / SIGNATURE -x Cement MV ; ProstheSet 13 / ProstheSet 14; PERFIX PLUS 1 / PERFIX PLUS 3; Synth-X OH / Synth-X OL ; BezCem® 1 / BezCem® 3; CM-PX 1 / CM-PX 3; DYNABONE 1 / DYNABONE 3 /; TEKCEM 1 / TEKCEM 3; C-fix 1 / C-fix 3; ArthroCem 1 / ArthroCem 3; Jointfix 1 / Jointfix 3; Prosthefix 1 / Prosthefix 3; C-Cem 1 / C-Cem 3.

1.2. Manufacturer name and address(es):

TEKNIMED S.A.S.		
Headquarters 8, rue du Corps Franc-Pommiès 65500 Vic en Bigorre France	*Production and facilities* 11-12, rue d'Apollo ZI de Montredon 31240 L'Union France	*Distribution site (labelling)* ZI de la Herray 65500 Vic en Bigorre France

1.3. Basic UDI-DI: 376017704B18DB

1.4. Year when the device was first CE-marked: 1998

2. Intended use of the device

2.1. Intended purpose

CEMFIX® bone cements are used to fix prosthesis into bone.

2.2. Indication(s) and intended patient groups

CEMFIX® bone cements are used in surgeries done to replace a joint (arthroplasty procedures). They are used with cemented prosthesis.
CEMFIX® bone cements are used in adult patients needing joint replacement.

2.3. Contraindications

- Procedures other than those listed in the INDICATIONS section.
- Issue in the different chemical processes that occur in the body to sustain life and normal functioning (metabolic disorder).
- Use in an infected bone site.
- Intolerance to constituents of the product (allergic reaction).
- Not enough data are available on some categories of patients. CEMFIX® cannot be used in young patients (children, adolescent and patient with immature skeleton). CEMFIX® cannot be used in breast-feeding or pregnant women.

3. Device description

CEMFIX® bone cements have been designed to fix prostheses (i.e., artificial joints) into bones of joints such as hip, knee or shoulder.

The bone cement is prepared just before the surgery. Liquid and powder are mixed together. The mixing is done either with a bowl and spatula or, for medium and low viscosity bone cements, with a mixing and injection kit. Right after mixing, the bone cement is applied and the prosthesis is positioned. After a delay of about a quarter of hour, the bone cement has fully hardened and the prosthesis is permanently fixed to the bone.



CEMFIX® bone cements are made of biocompatible synthetic components (molecules of the acrylic kind). The powder contains benzoyl peroxide (BPO) and the liquid contains N, N-dimethyl-ρ-toluidine (DMPT). When the liquid is added to the powder and mixed in accordance to the instructions for use, a cement of a given consistency depending on formulation is formed. The BPO from the powder and DMPT from the liquid react to generate free radicals by means of a redox reaction. The free radicals react with the monomeric liquid causing polymerisation and hardening of the cement.

CEMFIX® bone cements contain also particles which make them visible on X-rays. They help surgeons controlling the good fixation of the prosthesis in the cement.

The full composition of the bone cement is described in the table below:

COMPOSITION	Concentration (% w/w)	
	CEMFIX®1 High viscosity	**CEMFIX®3** Low viscosity
Powder phase	40g	40g
Polymethyl-methacrylate	87.6	87.6
Benzoyl peroxide	2.4	2.4
Barium sulphate	10.0	10.0
Liquid phase	14.4g	16.4g
Methyl-methacrylate	84.4	84.4
N-Butyl-methacrylate	13.2	13.2
N,N-Dimethyl-p-toluidine	2.4	2.4
Hydroquinone	20ppm	20ppm

CEMFIX® bone cements have an expected survival rate of 90% at 10 years. At the end of this expected lifetime, the cement does not need to be removed and does not need any maintenance, unless a medical complication would require a new surgery.

4. Risks and warnings

Contact your healthcare professional if you believe that you are experiencing side-effects related to the device or its use or if you are concerned about risks. This document is not intended to replace a consultation with your healthcare professional if needed.

4.1. Remaining risks and undesirable effects

Undesirable side effects of acrylic bone cements include:

- Low blood pressure reactions (hypotension) have been reported in the scientific literature, probably due to the release of bone cement components. The Bone Cement Implantation Syndrome (BCIS) is an undesirable side effect which can

impact the cardiac and circulatory system. Severe BCIS have been described in 5% of primary total knee or total hip surgeries, 2% of primary total shoulder surgeries and 7% of revision procedures of all joints, in scientific articles, but none with Cemfix® cements. Some patients have progressed to cardiac arrest (up to 0.17% reported in traumatology and 0.017% reported in scheduled procedures).
- Excessive heat generated during hardening of the bone cement (1 case reported on CEMFIX®1)
- Infection after surgery (2 cases reported on CEMFIX® bone cements)
- Bad fixation of the prosthesis can lead to a poor liaison between the bone and the cement resulting in a detachment of the prosthesis (no case reported with CEMFIX® cements). Long-term observation is thus recommended.

Any serious incident occurring in relation to the CEMFIX® cements must be reported without delay to TEKNIMED and the competent local authority where the user and/or the patient is established.

4.2. Warnings and Precautions

No warning and precautions for patients. This device is only used by healthcare professionals.
Patients with intolerance to bone cement components should mention it to their surgeon.

4.3. Summary of any field safety corrective action (FSCA) if applicable

No field safety corrective actions have been issued for CEMFIX® cements in the last 5 years.

5. Summary of clinical evaluation and post-market clinical follow-up

5.1. Clinical background

CEMFIX® is a product issued from a very-well known technology. It has been used in orthopaedic surgery for many years. It allows successful fixation of prosthetic implants into living bone cavity, leading to clinical benefits for the patients such as pain relief and improvement in quality of life. A long history of surveillance of its safety since its release on the market has proved that it carries no significant risks.

5.2. Clinical evidence for CE marking

CEMFIX® 1 & 3 were first CE marked and placed on the market in 1998. At that time, the clinical safety was demonstrated by equivalence with another product.

A. Summary of clinical studies conducted by Teknimed

A clinical study is currently on-going. 91 patients are up to now part of this study. CEMFIX® bone cements have been used in knee and hip. No issue has been recorded. Pain clearly improved. More than 90% of the patients were satisfied with the surgery. Bone cement performed well in all cases. 2 infections after surgery have been recorded. To conclude, the study shows that CEMFIX® bone cements are effective and safe.

B. Safety findings from real-life surveillance

During the last 5 years, no complaint about CEMFIX® 3 was recorded. One complaint was recorded for CEMFIX®1. One patient died during the surgery. The patient had general poor health condition (essential hypertension, arrhythmic heart rate, 83 years old). The death wasn't related to the cement.
No materiovigilance report were registered. No batch recall occurred.
No trend of device issue was identified. The rate of complaints versus sold units is very low. It confirms the long-term safety of CEMFIX® bone cements.

5.3 Safety

Teknimed is always doing clinical studies (Scientific literature reviews, Post-Market Surveillance and Clinical Follow-up). They document and evaluate the benefits and risks of CEMFIX®.
No new or unexpected risks were identified. Benefits were confirmed by clinical studies.
Regarding risks, the main one remains the risk of allergy to one component of the product. No other risks were identified during many years of post-market surveillance.

6. Possible diagnostic or therapeutic alternatives

When considering other treatments, it is recommended to contact your surgeon. He/She can take into account your individual situation.

To replace a joint, the surgeon can choose between two types of prostheses: cemented and uncemented. A cemented stem will usually have a very smooth surface. Its fixation into the bone shaft will be assured by an acrylic bone cement mantle between the metal and the bone. This cement interface must be thin and regular. An uncemented stem (also called cementless or press-fit), will usually be coated with a porous substance, such as a plasma spray with hydroxyapatite. The fixation of the stem into the shaft will be assured by the induced bone ingrowth into the porous coating.

No significative difference in the balance between benefit and risk for these two procedures (cemented versus uncemented) have been clearly demonstrated in the published literature. Their respective benefits and risks are still controversial. Consequently, the type of prosthesis used will be decided by the surgeon. This decision will be based on the patient age, lifestyle, and the surgeon's past experience.

7. Suggested profile and training for users

Product should only be used in clinics or hospitals. It should be used by qualified health care professionals. They need to be expert in orthopaedic surgery.