Hygiene-Institut des Ruhrgebiets
Institut für Umwelthygiene und Toxikologie
Direktor: Prof. Dr. rer. nat. L. Dunemann

HYGIENE-INSTITUT · Postfach 10 12 55 · 45812 Gelsenkirchen / GERMANY

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E-Mail a.koch@hyg.de
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Reference-No.: **K-216445-12-Ko**
Contact person: Dr. Andreas Koch

Gelsenkirchen, 09.05.2012

TEST CERTIFICATE
according to the KTW-Guideline

Product: **hose Refittex® Cristallo**

Test specimen: fibre reinforced hose, inner diameter: 6 mm outer diameter: 12 mm, uncolored

The test specimen meets the requirements according to the test report **Ref.-No.: K-216445-12-Ko** dated **09.05.2012** for the following applications and temperatures:

Applications:	**cold water (23°C)**	**warm water (60°C)**	**hot water (85°C)**
Pipes with DN < 80 mm (domestic distribution)	---	---	---
Pipes of diameter 80 mm ≤ DN < 300 mm (supply pipes)	---	---	---
Pipes of diameter DN ≥ 300 mm (main pipes)	---	---	---
Fittings for pipes with DN < 80 mm	passed	---	---
Fittings for pipes with 80 mm ≤ DN < 300 mm	passed	---	---
Fittings for pipes with DN ≥ 300 mm	passed	---	---
Sealings for pipes with DN < 80 mm	passed	---	---
Sealings for pipes with 80 mm ≤ DN < 300 mm	passed	---	---
Sealings for pipes with DN ≥ 300 mm	passed	---	---
Tanks in the domestic installations including repair systems	---	---	---
Tanks other than in domestic installations including repair systems	---	---	---

as far as technically suited.

If pipes, sealings or fittings and ancillaries do not differ in their material composition and process of manufacture, testing of the smallest diameter of the product range is sufficient.

This test certificate is valid beginning with the date of issue and is ending by **09.05.2017** as far as there are no changes in the formula. After this time it can be extended for further 5 years if demanded.

The Director of the Hygiene-Institute
on behalf of

Dr. rer. nat. Andreas Koch
Head of the Dept. for water
hygienic material testing

HYGIENE-INSTITUT DES RUHRGEBIETS Institut für Umwelthygiene und Toxikologie

The assessment was based on the assumption that the used starting substances and monomers used to manufacture the product may completely known and no other substances are present in the product. The validity of this document expires in case of modifications in the composition of the product or the processing conditions. The results and evaluations refer to the groups of test items. This document may not be published without our written permission only complete and unchanged or duplicated.

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-13042-02-00

Hygiene-Institut des Ruhrgebiets
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Reference-No.: **K-216445-12-Ko**
Contact person: Dr. Andreas Koch

Gelsenkirchen, 09.02.2012

TEST REPORT
according to the KTW-Guideline

Order of:	13.02.2012
Field of application:	Fittings for pipes with DN < 80 mm cold water (23°C)
Product:	**hose Refittex® Cristallo**
Test Specimen:	fibre reinforced hose, inner diameter: 6 mm outer diameter: 12 mm, uncolored
Date of receipt:	17.02.2012
Sampler:	transmitted by mail
Start of migration test:	28.02.2012
End of test:	08.05.2012

The Director of the Hygiene-Institute
on behalf of

Dr. rer. nat. Andreas Koch
Head of the Dept. for water
hygienic material testing

This test report consists of 2 pages.

The assessment was based on the assumption that the used starting substances and monomers used to manufacture the product may completely known and no other substances are present in the product. The validity of this document expires in case of modifications in the composition of the product or the processing conditions. The results and evaluations refer to the groups of test items. This document may not be published without our written permission only complete and unchanged or duplicated.

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TEST RESULTS
cold water area (23°C)

Product: **hose Refittex® Cristallo**

Test Specimen: fibre reinforced hose, inner diameter: 6 mm outer diameter: 12 mm, uncolored

Formula: submitted and checked (No.: 3252)

S/V-ratio migrationtest: 94,25 dm^2 / 1,40 dm^3 ≙ 67,32 dm^{-1}

S/V-ratio odour/flavour test: 94,25 dm^2 / 1,40 dm^3 ≙ 67,32 dm^{-1}

Test / Parameter	test steps each 3 days (72 hours) 1.-3. d	4.-6. d	7.-9. d	Requirements for Fittings for pipes with DN < 80 mm
colour	colourless	colourless	colourless	n.s.e.
turbidity	clear	clear	clear	n.s.e.
tendency to foam formation	none	none	none	n.s.e.
TON (23°C) **	2 *)	2 *)	1	< 2
TFN (23°C) **	n.e.	n.e.	1	< 2
total organic carbon (TOC) mg/dm^2 x d	0,023	0,020	0,018	≤ 0,125
parameter with limitations	QM/DWPLL-values, as far as analysed, are complied			

*) temporary detection of TON

** calculated for cat. Fittings for pipes with DN < 80 mm

n.s.e. = no significant effect
n.e. = not examined

TON = threshold odour number
TFN = threshold flavour number

HYGIENE-INSTITUT DES RUHRGEBIETS, GELSENKIRCHEN
Institut für Umwelthygiene und Toxikologie

Test methods used in qualification tests of materials in contact with potable water

Parameter	Test method
Odour / taste threshold (TON / TFN)	DIN EN 1622
Qualitative determination of colour, turbidity and foaming tendency	In-house test method Hy-KTW-5 (visual assessment)
Total organic carbon (TOC)	EN 1484
Chlorine demand	In-house test method KTW-14.6 after the BGA recommendation 1977 (photometric method)
Formaldehyde	In-house test method KTW-14.7 (photometric method)
Primary aromatic amines	In-house test method KTW-14.8 according to Section 35 (§ 35) of the German Federal Food and Consumer Goods Act (LMBG) (photometric method)
Phenols	DIN 38409 H16
Zinc	DIN 38406 E8
Lead	DIN 38406 E6
Epichlorohydrine	DIN EN 14207:2003
3-Mono-chloro-1,2-propanediol	In-hose test method Hy-AW-13 (gas chromatographic method)
Bisphenol A BADGE and Hydrolysis products BFDGE and Hydrolysis products	} In-house method Hy-W-37 (HPLC)

For the above-mentioned methods we are accredited.

We reserve the right to submit samples to qualified subcontractors for the verification of specific migration limits.

DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

Hygiene-Institut des Ruhrgebiets
Institut für Umwelthygiene und Umweltmedizin
Rotthauser Straße 19, 45879 Gelsenkirchen

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Physical, physicochemical, chemical, biological and specific ecotoxicological analyses of water, surface water, natural water, leachate, swimming pool water, waste water, sludge, sediments, solid wastes, matters for recycling and soils; microbiological analyses of water, surface water, swimming pool water as well as mineral and table water; analyses of drinking water as specified by the Trinkwasser-verordnung (German drinking water ordinance) from 2001 excluding radiological parameters; specific physicochemical, chemical and microbiological analysis of non-metallic materials in potable water supply; specific microbiological examination of disinfectants and materials; analyses of organic trace elements in water, aqueous migrates and plastics by means of HPLC-MS; analyses of organic trace elements in water, aqueous migrates and solid matters (i.a. plastics) by means of gas chromatography (GC-MS); sampling of water, natural, potable and waste water, leachate, swimming pool water, water from aquifers and flowing water bodies, soil vapour and sludges; determination (sampling and analysis) of airborne organic gaseous particles, fibrous particles and microbiological substances within the frame of indoor measurements; determination (sampling and analysis) of airborne fibrous particles within the frame of measurements at workplace; determination (sampling and analysis) of particle precipitations within the frame of immission measurements; analysis of solid matters and dust with regard to fibrous particles; determination (sampling and analysis) of inorganic and organic gaseous or particulate air constituents in immission; determination (sampling and analysis) of fibrous particles in immission; sampling of airborne polyhalogenated Dibenzo-p-Dioxins and Dibenzofuranes in immission; modul immission control; technical modules water, soil and contaminated sites as well as waste

The accreditation certificate shall only apply in connection with the notice of accreditation of 12.11.2010 with the accreditation number D-PL-13042-02 and is valid until 18.06.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 66 pages.

Registration number of the certificate: **D-PL-13042-02-00**

Berlin, 12.11.2010

p. p. Valbuena
Andrea Valbuena
Head of Division

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

DVGW
CERT GMBH

ZERTIFIKAT

LW-BU0440

über die Anerkennung als DVGW-Prüflaboratorium

Das Prüflaboratorium

Hygiene-Institut des Ruhrgebiets -Umwelthygiene-
Rotthauser Str. 19, 45879 Gelsenkirchen
DEUTSCHLAND

ist als

DVGW-Prüflaboratorium Wasser

anerkannt und damit berechtigt, Produktprüfungen für die DVGW CERT GmbH in dem bescheinigten Bereich durchzuführen. Die Anerkennung ist an die Person der Leitung des Prüflaboratoriums bzw. dessen Stellvertretung gebunden.

Leitung des Prüflaboratoriums: **Dr. rer. nat. Andreas Koch**

Stellvertretung: **Dr. rer. nat. Georg-Joachim Tuschewitzki**
Dr. rer. nat. Christiane Schell

Die Anerkennung gilt nur in Verbindung mit der gültigen Anlage zum anerkannten Prüfumfang, sowie der aktuellen Geschäftsordnung zur DVGW-Zertifizierung von Produkten. Sie gilt bis zum 04.01.2015, sofern die Voraussetzungen, die zur Anerkennung geführt haben, unverändert bleiben. Die Erstanerkennung erfolgte am 04.01.2010.

13.01.2010 Sh A
Datum, Bearbeiter, Blatt, Leiter der Zertifizierungsstelle

DVGW CERT GmbH - allgemein anerkannte Zulassungsstelle für die Prüflaboratorien im Gas- und Wasserfach

DVGW CERT GmbH - commonly recognized approval body for testing laboratories in the German gas and water industry

DVGW CERT GmbH
Josef-Wirmer-Straße 1-3
53123 Bonn
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Telefax: +49 228 91 88-993
eMail: info@dvgw-cert.com

Warranty/Damages for Default

The Association, its legal representatives, agents and employees are liable to the Principal and third parties which are protected by the Agreement, for all claims for default, irrespective of which legal reason, which arise under this Agreement or due to an offence (Art. 823 BGB [*German Civil Code*]) only in case of intent or gross negligence but not in case of ordinary negligence.

The personal liability of the legal representatives, agents and employees of the Association to the Principal shall be excluded except in case of intent or gross negligence.

The exemption from liability shall apply especially to claims for damages which arise from positive breach of the Agreement and from unlawful acts. The exemption from liability comprises any and all property damages, deficiency losses and consequential damages as well as indirect and direct financial damages of the Principal and the persons which are protected under this Agreement.

In case of Agreements with a consumer (consumer agreements) the above mentioned legal limitations shall not apply to the liability for damages arising from the injury of life, body or health which were caused by the negligent breach of obligations of the Association or an intended or negligent breach of obligations of a legal representative, agent or employee of the Association.

If individual parts of this exemption from liability or this limitation of liability are invalid, the validity of the clause shall not be affected.

Hygiene-Institut des Ruhrgebiets
Institut für Umwelthygiene und Toxikologie
Direktor: Prof. Dr.rer.nat. Lothar Dunemann
Träger: Verein zur Bekämpfung der Volkskrankheiten im Ruhrkohlengebiet e.V.

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E-Mail a.bernoussi@hyg.de
Internet www.hyg.de

Reference-No.: K-232227-13-Bs/st
Contact person: Anasse Bernoussi (Eng.)

Gelsenkirchen, 17.07.2013

TEST CERTIFICATE
according to the KTW-Guideline

Product: **CRISTALLO Extra** without yarn and cover layer

Test Specimen: inner hose $Ø_a$ 6 mm $Ø_i$ 4 mm (transparent)

The test specimen meets the requirements according to the test report no.: **K-232227-13-Bs/st dated 17.07.2013** for the following application(s) and temperature(s), as far as technically suited:

Applications:	**cold water (23°C)**	**warm water (60°C)**	**hot water (85°C)**
Pipes with DN < 80 mm (domestic distribution)	---	---	---
Pipes of diameter 80 mm ≤ DN < 300 mm (supply pipes)	---	---	---
Pipes of diameter DN ≥ 300 mm (main pipes)	---	---	---
Fittings for pipes with DN < 80 mm	passed	---	---
Fittings for pipes with 80 mm ≤ DN < 300 mm	passed	---	---
Fittings for pipes with DN ≥ 300 mm	passed	---	---
Sealings for pipes with DN < 80 mm	passed	---	---
Sealings for pipes with 80 mm ≤ DN < 300 mm	passed	---	---
Sealings for pipes with DN ≥ 300 mm	passed	---	---
Tanks in the domestic installations including repair systems	---	---	---
Tanks other than in domestic installations including repair systems	---	---	---

If pipes, sealings or fittings and ancillaries do not differ in their material composition and process of manufacture, testing of the smallest diameter of the product range is sufficient.

This test certificate is valid beginning with the date of issue and is ending by **17.07.2018** as far as there are no changes in the formula.

The Director of the Hygiene-Institute
on behalf of

Dr.rer.nat. Andreas Koch
Head of the Dept. for water
hygienic material testings

HYGIENE-INSTITUT DES RUHRGEBIETS Institut für Umwelthygiene und Toxikologie

The assessment was based on the assumption that the used starting substances and monomers used to manufacture the product may completely known and no other substances are present in the product. The validity of this document expires in case of modifications in the composition of the product or the processing conditions. The results and evaluations refer to the groups of test items. This document may not be published without our written permission only complete and unchanged or duplicated.

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HYGIENE-INSTITUT DES RUHRGEBIETS, GELSENKIRCHEN
Institut für Umwelthygiene und Toxikologie

Test methods used in qualification tests of materials in contact with potable water

Parameter	Test method
Odour / taste threshold (TON / TFN)	DIN EN 1622 (B3)
Qualitative determination of colour, turbidity and foaming tendency	In-house test method Hy-KTW-5 (visual assessment)
Total organic carbon (TOC)	EN 1484 (H3)
Chlorine demand	In-house test method KTW-14.6 after the BGA recommendation 1977 (photometric method)
Formaldehyde	In-house test method KTW-14.7 (photometric method)
Primary aromatic amines	In-house test method KTW-14.8 according to Section 35 (§ 35) of the German Federal Food and Consumer Goods Act (LMBG) (photometric method)
Phenols	DIN EN ISO 14402 (H37)
Zinc	DIN EN ISO 17294-2 (E29)
Lead	DIN EN ISO 17294-2 (E29)
Epichlorohydrine	DIN EN 14207 (P9)
3-Mono-chloro-1,2-propanediol	In-hose test method Hy-AW-13 (gas chromatographic method)
Bisphenol A BADGE and Hydrolysis products BFDGE and Hydrolysis products	} In-house method Hy-W-37 (HPLC)

For the above-mentioned methods we are accredited.

We reserve the right to submit samples to qualified subcontractors for the verification of specific migration limits.

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Deutsche Akkreditierungsstelle GmbH

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Registration number of the certificate: **D-PL-13042-02-00**

Berlin, 15.06.2012

Andrea Valbuena
Head of Division

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ZERTIFIKAT

LW-BU0440

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Datum, Bearbeiter, Blatt, Leiter der Zertifizierungsstelle

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