FORVALTNING, DRIFT OG VEDLIKEHOLD

PROSJEKT:……..

Entreprise:	**Entreprenør/leverandør** **navn, adresse, tlf, e-post, kontaktperson)**
……..	…….
……..	…….
Underleverandør:	
Leveranse:	**Underleverandør** **(navn, adresse, tlf, e-post, kontaktperson)**
Leverandør: Adaptor Hjelpemidler AS Garanti/reklamasjon: Installatør:	Sporveisgata 10 0352 Oslo, bc@adaptor.no, 23215555 Adaptor bestillings nr./lev dato:……. (for gyldig garanti/reklamasjon på produkt) ……

Beskrivelse av leveranse sted adresse ol: Prosjekt: ……...
Beskrivelse av installasjon: **Produkt levert**: **Type nr**.: ……..… **Dimensjoner (l x b x d/t)**: …… **Produkt overflate type og eventuell behandling**: …….... **Krav etter TEK 17/NS referert til i FDV er fulgt:** …… **Eventuelle avvik: (begrunn/dokumenter tiltak):** …… …… **Installasjons metode**: …… **Annen relevant informasjon**: …… ……..

FORVALTNING, DRIFT OG VEDLIKEHOLD

Materialspesifikasjon på produkter:

Lede/oppmerksomhet:

- BP1011510 (med pinne, uten pinne/med, konete skruehull, tapelim Bimek, VHB5925F) (inkludert i alle edelmetaller)
- BP1011512 (Aluminium)

Fare:

- BP1011410, BP1011412- Ø35 (inkludert, aluminium og alle edelmetaller) (med/uten pinne, konet skruehull, med tape lim Bimek og VHB5925F
- BP1011413, BP1011414 - Ø25 (med/uten pinne, med tape lim Bimek, VHB5925F (inkludert, aluminium og alle edelmetaller)

Se vedlagt teknisk spesifikasjon:
Vedlegg i FDV: Ilegg Desmopan 3055DU (brann/ avgasser/andre egenskaper)
Vedlegg i FDV: Skli dokumentasjon
Vedlegg 1: Produktblad taktile stål og aluminium gulvelement med og uten ilegg.

Produktene kan leveres i:

- Syrefast stål (316L)
- Rustfritt stål (303/304)
- Aluminium (maritim type/ EN AW-6082)
- Messing (se produkt ark)
- Kobber (se produktark)
- Bronse (se produktark).

Datablad for edelmetaller ved behov:

- Produktblad taktile gulvelementer med/uten ilegg i messing, bronse og kobber

Ilegg: Desmopan 3055D (**TPU**). 2,7 – 5 mm
Forbo gulvbelegg 3,5 - 5 mm **(PVC)**
Heskins Aqua Safestep eller Safety Grip. 2,7 – 5 mm **(PVC)**
Eventuelt egen dokumentasjons underlag for annet ilegg ut over Desmopan og Forbo Surestep separat.

Lysrefleksjonsverdi avhengig av valgt std. farge i Desmopan:

- Svart/RAL 9004 - LRV: 6
- Mørk grå: RAL7015 - LRV: 9
- Grå brun: RAL 8019 – LRV: 9
- Mørk rød: RAL3001 - LRV 10.
- Std grå: RAL 7004 - LRV: 34
- Lys grå: RAL 7035 - LRV: 57
- Lys beige – LRV: 60
- Gul: RAL1018 - LRV 63.
- Hvit: RAL 9003 - LRV: 80

Andre farger kan bestilles mot et tillegg.
UV- sikre (forutsetter bruk av std farger eller UV- sikker farge).
Vedlagt: Ilegg av Desmopan 3055DU (TPU) med skli og brannhemmende polyuretan (tilsvarende: R10-11 (DIN - std)).

FORVALTNING, DRIFT OG VEDLIKEHOLD

Std gulvbelegg Forbo Surestep og Safestep.

- Carlcoale/ svart LRV: 6. Std
- Clay/beige LRV: 47.
- Snow/hvit LRV: 75.
- Morator/beige LRV: 45
- Corn/gul LRV: 52

Surestep: R10 etter DIN 51130 std. Safestep: R11 etter DIN 51130 std.

Produktet skal levere en luminanskontrast mot underlaget på over 0,8 foran trapper. Ellers er kravet 0,4 ifølge TEK 10/17 og NS11001:2018. Se ellers egne krav for Veivesenet og Jernbaneverket.

Sklihemmende egenskaper: Fare og oppmerksomhetsfelt skal i trappeløp levere en sklihemmende egenskap på R10 eller høyere etter DIN-51130 std. Andre std kan også brukes. (Produktet skal være sklihemmende i både våt og tørr tilstand. Som ledelinje holder R9 etter DIN 51130. (Sklihemmende i tørr tilstand). (Se rapporter som vedlegg under.)

Elementene kan monteres innendørs og utendørs (2-4 mm tykke innendørs og 4-5 mm tykke utendørs). Innendørs med f.eks.: TEC 7 eller Sikabond T2 (som er Breeam sertifisert). I tillegg kan de monteres med tape lim. Her tilbys: 3M VHB 5925F og Bimeks. Utendørs med pinner i varierende lengder (std 12 mm) på betong og konete skruehull/skruer på treverk. Ilegge kommer da separat og er påsatt tapelim. Elementene tilfredsstiller ISO 23599. For flere mål se detaljer for hvert enkelt produkt i produktlisten. Forbo gulvbelegg kan kun legges inne. Vi anbefaler syrefast stål (316) utendørs.

Syrefast stål AISI 316

Stålets rustfrie egenskap er et resultat av at det er legert med krom. Når dette gjøres, oppstår det en usynlig, beskyttende hinne, som øker stålets motstandskraft mot korrosjon.
I syrefast stål er det i tillegg tilsatt molybden som er med på å øke stålets motstandskraft.
Syrefast stål inneholder også mindre karbon enn alminnelig rustfritt stål. Dette gjør at stålet kan utsettes for større kjemiske påkjenninger.
Syrefast stål er ikke-magnetisk.
Syrefast eller syrebestandig stål inneholder foruten jern og krom, en del nikkel og/eller mangan samt mindre mengder av andre metaller som molybden og titan.
Syrefast stål brukes i miljøer med stor kjemisk belastning som kystmiljø, industrimiljø eller annen kontakt med syrer.

Tepper og innfesting:

Varianter med pinne eller skruehull kan benyttes. Ta høyde for teppe tykkelsen.
Elementene kan monteres med lim eller tapelim på enkelte kort bustede tepper (tester må gjennomføres). Om en skal bruke tapelim skal VHB 5925F benyttes. I et slikt miljø kan hefte egenskapene og levetiden være noe begrenset. Elementene kan kun monteres på helt rent underlag. D.v.s. nye tepper eller dypensede tørre tepper. Teppe må ha en jevn overflate. Om elementene skal legges i inngangsområder på tepper må løsningen gi rom for at teppe periodisk tørker opp og ikke alltid er våte. Elementene må være på minst 3,5 mm tykkelse. Vi anbefaler ikke montering på sviktende underlag siden elementene kan bli bøyd. Velg eventuelt høyere tykkelse om underlaget er sviktende siden det gjør dem stivere. Type

BP1011410 og BP10111413 anbefales ikke brukt på tepper (35 -25 mm) siden heftflaten er for liten.

Sveiset pinne:
Vi anbefaler bruk av sveiset pinne i relasjon til stål produkter. Når det gjelder edelmetaller og aluminium anbefaler vi støpt pinne. Dette siden metallene er mykere, og sveiseskjøten kan bli svak. Dette er spesielt kritisk på fareknotter som kun har en pinne. Produsenten garanterer ikke sveiseskjøtene på disse metallene.

Bruk og installasjon utendørs:
For å få en sterk innfesting utendørs er det viktig at elementer presses hardt ned mot limet med en rulle. Det skal ikke forekomme luftbobler mellom elementer og underlaget. Se egen beskrivelse ved behov. Ved bruk av stål elementene utendørs anbefales det bruke av pigg (BP1011510 (med pigg), 412 og 414). Elementene anbefales ikke direkte montert på asfalt. Dette siden asfalt blir mykt i solen og på den måten kan elementene løsne.
På treverk kan en montere elementene med skruer. Bruk galvaniserte eller rustfrie konete skruer tilsvarende 4 x 20 – 40 mm.

Ved feste på områder som det skal benyttes skjæreblad på må elementene freses ned tilsvarende høyde på elementene. Ved bruk av pigg leveres denne standard med 12 mm riflete mønster. De kan bestilles med andre lengder.
Ved bruk av tapelim utendørs må utetemperaturen være på + 5 C eller høyere.

FORVALTNING, DRIFT OG VEDLIKEHOLD

Minimumskrav i forhold til installasjons tetthet og produktegenskaper:

For å få en trygg og forsvarlig installasjonsløsning må en følge TEK 10/17 og retningslinjene gitt i NS11001:2018 vedlegg P750:2014 og ISO23599. Her spesifiseres bl.a. minimumskrav og utforming av elementene for bruk i Norge og internasjonalt. Alle elementer/maler Adaptor Hjelpemidler AS leverer i Norge følger anbefalinger gitt i Norge og eventuelt internasjonalt der dette ikke er nevnt i norske forskrifter eller std.. Der det ikke er spesifisert i norske dokumenter følger vi internasjonale minimumskrav.

Generelle krav:

Innendørs taktil høyde på 3 mm +/- 1 mm, utendørs 5 mm +/-1 mm (norsk), reisvinkel på element ikke over 45 grader (International - ISO 23599).

Ved trapper skal elementene være sklisikre i både våt og tørr tilstand (norsk). Tilsvarer minimum R10 etter DIN51130 std ol..

Luminanskontrast: (Bakgrunnsfarge LRV – element farge LRV)/ Bakgrunnsfarge LRV

Farefelt:

Dybde: 60 cm (norsk), diagonale felt anbefales, avstand mellom sentrum av knotter maks 70 mm senter avstand på Ø25 mm elementer (målt på toppen) /tilsvarer Ø35mm i bunn avhengig av elementhøyde). Dette gir ca 126 knotter pr 0,6 m2)

Maks 68 mm senteravstand på Ø20 mm elementer (målt på toppen)/tilsvarer Ø25mm målt i bunn. (ca 143 knotter pr 0,6 m2) knotter (målt på toppen/tilsvarer 25mm i bunn avhengig av elementhøyde) (International - ISO23599). Disse minimums kravene er gitt for at felte skal være stabilt og trygt å gå på. Sklisikkerhetstester er også gjennomført etter disse min kravene for mønster. Krav til luminanskontrast inne:0,8. Ute: 0,4.

Oppmerksomhetsfelt:

Dybde 60 cm (norsk), avstand mellom elementene maks 83 mm på 25 mm bredde på toppen/6 rekker (målt på toppen/tilsvarer 35 mm bredde i bunn avhengig av elementhøyde). 80 mm avstand mellom elementene på 20 mm/7 rekker (målt på toppen/tilsvarer 25 mm bredde avhengig av elementhøyde) (International - ISO23599). Disse minimums kravene er gitt for at felte skal være stabilt og trygt å gå på. Sklisikkerhetstester er også gjennomført etter disse min kravene for mønster. Krav til luminanskontrast inne:0,8 (trapp). 0,4 (heis mm). Ute: 0,4.

Ledelinje:

Mindre områder: Minimums krav på elementers bredde er 20 mm på linjen (norsk - krav til luminans kontrast og bredde på denne). Med ilegg i metall elementer gir det en minimumsbredde på 30 – 35 mm i bunn avhengig av høyde siden ilegg må være minst 20 mm bred. Store områder inne og utendørs skal ledelinje være 15 - 30 cm i bredde (norsk anbefaling). Bredden på feltet skal stå i stil til rommets/områdets størrelse.

Alle produkter blir montert etter disse minimumskravene eller bedre. Alle produkter følger norske og internasjonale krav. Krav til luminanskontrast inne og ute: 0,4.

Avfall/miljø: Avhendes som metall avfall. Ilegg er enten et PVC (Forbo Sure/Safestep) eller et TPU (Desmopan) materiale.
Inneholder ikke ftalater. TPU kan resirkuleres 100%. PVC'en her er 70% resirkulert. Alle produkter godt innenfor alle EU krav.

FDV vedlegg se under:
Avgasser og andre egenskaper på std Desmopan ilegg:

Statement on Polycyclic Aromatic Hydrocarbons (PAHs)

page 1 of 1

Polycyclic aromatic hydrocarbons (PAHs) have not been intentionally added for the production of the Covestro's thermoplastics

APEC, Bayblend, Desmopan, Makrolon and **Makroblend**

and are not expected to be contained.

The presence of analytically detectable traces of the above mentioned substances, which occur widely and have possibly been introduced into our product via the raw materials, auxiliaries and additives, can not be excluded.

An analysis of typical grades gave the following result:
Sum of PAHs: < 10 ppm
Benzo (a) pyrene: < 1 ppm

Covestro Deutschland AG
D-51365 Leverkusen, Germany
IO-S&A-PSRA
Product Safety & Regulatory Affairs

Date: 2015-10-23

Board of management: Patrick Thomas (chairman), Frank H. Lutz, Klaus Schäfer, Markus Steilemann
Chairman of the supervisory board: Richard Pott
Registered office: 51365 Leverkusen, Local court of Cologne, HRB 49892

Desmopan® DP 3055D - TPU
Covestro Deutschland AG

Light stability delta a	X	X	-	-	DIN 53236
Light stability delta b	X	X	-	-	DIN 53236
Light stability delta E	X	X	-	-	DIN 53236
Light stability grey scale	X	X	-	-	ISO 105-A02

Dynamic mechanical analysis (I,M,E)

Dynamic Shear modulus-temperature
No data available

Dynamic Tensile modulus-temperature
No data available

[1]I=Interior parts, M=Parts in motor compartment, E=Exterior parts

VDA CAMPUS® Datasheet

Desmopan® DP 3055D - TPU
Covestro Deutschland AG

Physical properties	I	M	E[1]	Value	Unit	Test Standard
Melt volume-flow rate, MVR	X	X	X	-	cm³/10min	ISO 1133
Temperature	X	X	X	-	°C	ISO 1133
Load	X	X	X	-	kg	ISO 1133
Viscosity number	X	X	X	*	cm³/g	ISO 307, 1157, 1628
Molding shrinkage, parallel	X	X	X	-	%	ISO 294-4, 2577
Molding shrinkage, normal	X	X	X	-	%	ISO 294-4, 2577
Humidity absorption	X	X	X	-	%	Sim. to ISO 62
Water absorption	X	X	X	-	%	Sim. to ISO 62
Density	X	X	X	1220	kg/m³	ISO 1183
Type and amount of reinforcement				-	-	ISO 3451-1

Mechanical properties	I	M	E[1]	Value	Unit	Test Standard
Tensile Modulus	X	X	X	-	MPa	ISO 527-1/-2
Yield stress	X	X	X	-	MPa	ISO 527-1/-2
Stress at break	X	X	X	-	MPa	ISO 527-1/-2
Yield strain	X	X	X	-	%	ISO 527-1/-2
Strain at break	X	X	X	-	%	ISO 527-1/-2
Charpy impact strength, +23°C	X	X	X	-	kJ/m²	ISO 179/1eU
Charpy notched impact strength, +23°C	X	X	X	-	kJ/m²	ISO 179/1eA
Charpy impact strength, -30°C	X	X	X	-	kJ/m²	ISO 179/1eU
Charpy notched impact strength, -30°C	X	X	X	-	kJ/m²	ISO 179/1eA
Puncture test - ductile/brittle transition temperature	X		X	-	°C	ISO 6603-2

Thermal properties	I	M	E[1]	Value	Unit	Test Standard
Melting temperature, 10°C/min	X	X	X	*	°C	ISO 11357-1/-3
Temp. of deflection under load, 1.80 MPa	X	X	X	-	°C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	X	X	X	-	°C	ISO 75-1/-2
Temp. of deflection under load, 8.00 MPa	X	X	X	-	°C	ISO 75-1/-2
Vicat softening temperature, 50°C/h 50N	X	X	X	-	°C	ISO 306
Coeff. of linear therm. expansion -40°C to +100°C, parallel	X	X	X	-	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion -40°C to +100°C, normal	X	X	X	-	E-6/K	ISO 11359-1/-2
FMVSS				-	-	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	X			-	mm/min	ISO 3795 (FMVSS 302)
Burning Behav. at 1.5 mm nom. thickn.		X	X	-	class	IEC 60695-11-10

Emission / Odor	I	M	E[1]	Value	Unit	Test Standard
Emission of organic compounds	X			-	µgC/g	VDA 277
Thermal desorption analysis of organic emissions	X			-	µg/g	VDA 278
Odor test	X	X[2]		-	class	VDA 270

Weather stability, ISO 4892-2, Method A	I	M	E[1]	Value	Unit	Test Standard
Weather stability delta l			X	-	-	DIN 53236
Weather stability delta a			X	-	-	DIN 53236
Weather stability delta b			X	-	-	DIN 53236
Weather stability delta E			X	-	-	DIN 53236
Weather stability grey scale			X	-	-	ISO 105-A02

Light stability, ISO 4892-2, Method B	I	M	E[1]	Value	Unit	Test Standard
Light stability delta l	X		X	-	-	DIN 53236

[1] I=Interior parts, M=Parts in motor compartment, E=Exterior parts
[2] air-ducting parts with contact to interior

Datasheet according to an agreement between VDA (Association of the Automotive Industry) and CAMPUS®
All data is subject to the producer's disclaimer.
http://www.campusplastics.com - Covestro - 2015-10-29

Page 1 of 2

Brannegenskaper - Desmopan

All organic substances – including plastics – are combustible. A material's fire performance is essentially described by the following parameters:

- ignitability
- flame spread
- heat release
- smoke development (smoke density and toxicity of the fire gases)
- surface-to-mass ratio of the combustible materials

In addition to being influenced by the material-inherent components, fire performance is additionally determined by associated factors, such as

- distribution
- type of storage
- quantity of material
- thermal pre-treatment
- ventilation
- exposure time and intensity of the ignition source, etc.

In view of the complexity of the influencing variables, it is not possible to provide a universally valid description of the fire performance of Desmopan® grades. A large number of standards and regulations describe what are frequently highly specific applications and test procedures, but these do not have any absolute information value. In case of doubt, please contact our technical product support team, who will be pleased to provide advice and assistance at all times. A number of particularly important and widely-used fire tests are listed below. This list does not claim to be exhaustive.

UL 94 (Underwriters Laboratories)

Desmopan® grades without additives essentially attain an HB classification; a number of grades without flame retardants also achieve a V2 classification. We can send you Yellow Cards for a number of grades on request.

ISO 4589 (ASTM D 2863; Lowest Oxygen Index; LOI value)

The Lowest Oxygen Index (LOI) indicates the minimum oxygen concentration that must be present in an oxygen/nitrogen mixture for a material to burn. To measure the LOI, a mixture of O2/N2 with a decreasing O2 content is fed to a burning specimen until the flame extinguishes. Desmopan® grades attain values of between 18 and 24 %.

ISO 871 (ASTM D 1929; external ignition; self-ignition)

These tests involve exposing a sample to a pilot flame in a hot-air oven or determining the self-ignition temperature of the sample in the hot-air oven. This method can be used to compare different plastics under identical conditions, but it does not provide a generally-valid statement on combustibility or burning rate. Desmopan® grades have an external ignition temperature of between 350 and 400 °C, and a self-ignition temperature of between 450 and 600 °C.

Burning behavior to FMVSS 302

Various Desmopan® grades have been tested to test standard FMVSS 302. The requirements of the standard have always been satisfied. According to FMVSS 302, burning rates of up to 101.6 mm/min are permitted. The burning rates measured were between 15 and 65 mm/min, depending on the Desmopan® grade, the Shore hardness and the wall thickness. We thus assume that all Desmopan® grades satisfy the requirements of test standard FMVSS 302. Please contact us if you have any further questions in this respect.

DIN EN 50267-2-2 (corrosiveness of combustion gases)

All non-modified Desmopan® grades meet the requirements of this standard, which relates to the corrosiveness of the combustion gases.

Glow wire test to IEC 60695-2-12 (DIN EN 60695-2-12)

The material fulfils the requirements if none of the three specimens has a flaming combustion time of more than 30 sec. and if the underlying tissue paper is not ignited by flaming droplets. Values for this test are available for a number of Desmopan® grades.

Glow wire test to IEC 60695-2-13 (DIN EN 60695-2-13)
This specifies a temperature that is 25 °C higher than the highest temperature prevailing at the tip of the glowing wire which does not lead to ignition in three successive tests. (ignition is defined as a flame that is visible for more than 5 sec.) Values for this test are available for a number of Desmopan® grades. Additives can influence the fire performance of Desmopan® grades. Further details may be found in our Safety Data Sheets.

The Thermoplastics Testing Center (TTC) will carry out the following fire tests for you:

Fire Test Method	Standards
Flammability UL 94 HB	UL 94
Flammability UL 94 V	UL 94
Flammability UL 94-5V	UL 94
Electrical ignition source	IEC 60695-2-13
Glow wire	IEC 60695-2-12
HWI	ASTM D3874
Ash content	ISO 3451-1 in-house standard (rapid ash)

See other related properties:
Link: https://www.tpu.covestro.com/Technologies/Properties/Chemical-Physical-Structure.aspx

Sklihemmende test rapport for Desmopan (TPU) ilegg:

(krav i TEK 10/17 om produktene skal legges ved/i trappeløp)

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Constructions Prague
Akreditovaná zkušební laboratoř, Autorizovaná osoba, Certifikační orgán, Inspekční orgán
Accredited Test Laboratory, Authorised Body, Certification Body, Inspection Body

Branch 0300 – Plzeň

REPORT

No. 030 – 051633

on determination of slipperiness

Customer: **OLEJÁR, spol. s r.o.**
Nižná Polianka 65
086 36 Nižná Polianka, Slovakia

Order no.: – – from 20. 5. 2015

Order No.: Z030150209

Enclosures: –

This Report has been made in duplicate. The first original copy is for the customer, the other will be filed along with other documentation in TZÚS Plzeň.

Person responsible for the wording of this Report:

Ing. Hana Kotorová
Report Author

Person responsible for the correctness of this Report:

Plzeň 4th June 2015

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Pobočka Plzeň
326 00 Plzeň-Slovany, Zahradní 15
IČ 00015679 (1)

Stamp TZÚS - Plzeň Branch

Ing. Alexander Trinner
Branch Manager

Statement:
1) *The test results relate to the items under test (samples) only.*
2) *This report may not be reproduced otherwise than complete without the written consent of TZÚS.*

Technický a zkušební ústav stavební Praha, s. p., Pobočka 0300 - Plzeň, Zahradní 15, 326 00 Plzeň, Česká republika
☎: 377 243 331, ☎: 377 430 345, Fax:+420 377 430 347, Internat.:+420 377 244 158, e-mail: kotorova@tzus.cz, www.tzus.cz
Bankovní spojení (Bank): KB Praha 1 Czech Republic, ú.č.: 1501-931/0100 IČ: 000 15679 DIČ/VAT: CZ00015679

1 Initial Data

1.1 Assignment

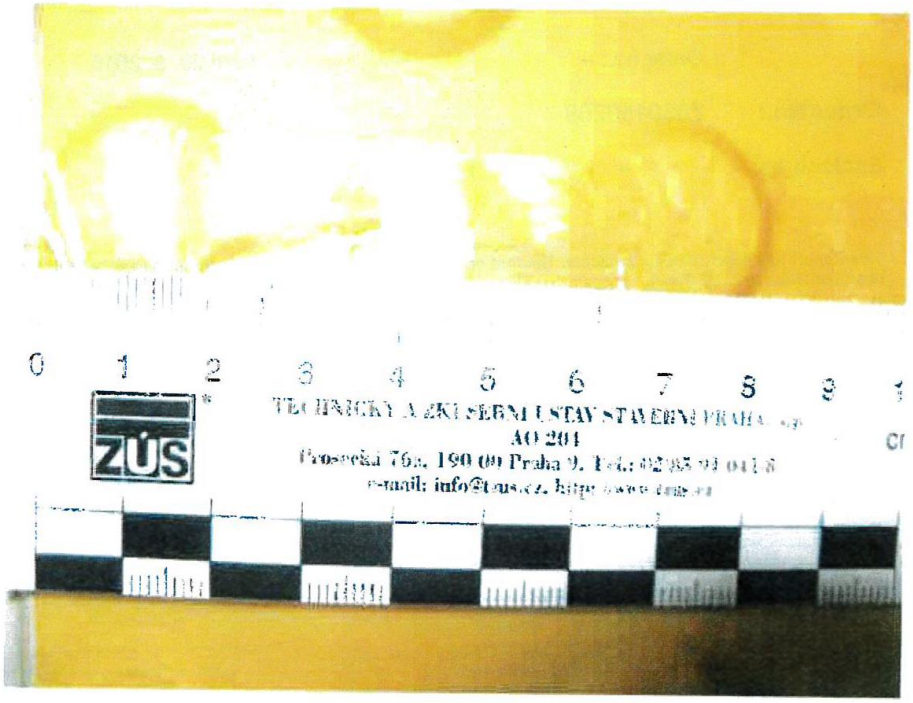
- Execution of tests of slipperiness of flooring according the requirement of the client:
  - **determination of slipperiness – walking methods – ramp test** (shoes) according DIN 51130, P CEN/TS 16165 (annex B)

1.2 Samples

- Sample specification: Polyurethane Floorings
  flooring: TPUP tactile warning plates
  flooring: TPU tactile warning studs
  flooring: TPU tactile guiding strips
  flooring: TPUP tactile guiding plates
- Producer: OLEJÁR, spol. s r.o., Nižná Polianka 65, 086 36 Nižná Polianka, Slovakia
- Samples supplied on 10. 4. 2015.

2 Sampling Method

The test specimens of approximate overall dimensions of 60×100 cm were delivered by the customer to Plzeň Branch in four types. After takeover, the specimens were registered as follows: No. VZ 030150572



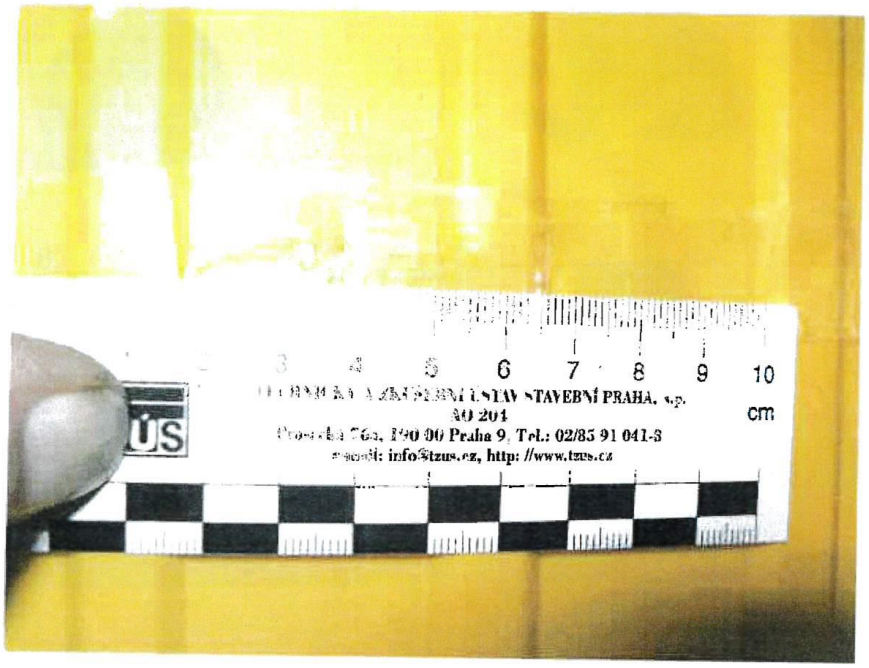
TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Pobočka Plzeň
326 00 Plzeň-Slovany, Zahradní 15
IČ 00015679 (1)

No. VZ 030150573

No. VZ 030150574

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Pobočka Plzeň
326 00 Plzeň-Slovany, Zahradní 15
IČ 00015679
(1)

No. VZ 030150575



As required by the customer, slip resistance was determined according to DIN 51130, ČSN P CEN/TS 16165 (Annex B). Other slip resistance testing methods (pendulum swing method, tribometric method, friction coefficient, ...) are not suitable for this flooring relief type as they would distort the results of the slip resistance tests of the face surface.

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Pobočka Plzeň
326 00 Plzeň-Slovany, Zahradní 15
IČ 00015679
(1)

3 Testing Procedures

DIN 51130	Testing of floor coverings – Determination of the anti-slip property – Workrooms and fields of activities with slip danger – Walking method – Ramp test
P CEN/TS 16165	Determination of slip resistance of pedestrian surfaces – Methods of evaluation

4 Measurements and Tests

Determination of slipperiness – walking methods – ramp test DIN 51130, P CEN/TS 16165 (method B)

Flooring designation	Critical angle of slip classification shoe	
VZ 030150572 (TPUP tactile warning plates)	23,3°	R11
VZ 030150573 (TPU tactile warning studs)	21,3°	R11
VZ 030150574 (TPU tactile guiding strips)	14,7°	R10
VZ 030150575 (TPUP tactile guiding plates)	17,5°	R10

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IČ 00015679 (1)

5 Conclusion

5.1

The polyurethane flooring under test **TPUP tactile warning plates, TPU tactile warning studs** manufactured by OLEJÁR, spol. s r.o., Nižná Polianka 65, 086 36 Nižná Polianka, Slovakia was classified according DIN51130, P CEN/TS 16165 (method B) into **Group R 11** and can be used to secure the assembly floor eg. for kitchens with a capacity of up to 100 meals a day, school kitchens, stores, factories juices etc.

The polyurethane flooring can also be used as Group R10 can therefore be used to construct safe floors, for instance in storerooms, kitchens where food is defrosted and heated, in sanitary rooms, in rooms where packaged meat is sold, etc.)
and as Group R9 (to construct safe floors, for instance in rooms for medical diagnostic equipment, massage rooms, laboratories, etc.).
The flooring also **meets the requirements** specified in Art. 4.17 of **ČSN 74 4505 Floors – Common Provisions in accordance with** Article 21(2),(3) of **Regulation No. 268/2009 Coll., on technical requirements for products, for floors in all apartment and dwelling rooms** that must conform to **the value of slipping angle of at least 6°, and it also meets the requirements for floors in the parts of structures used by the public including shopping arcades and covered passageways** that must conform to **the value of slipping angle of at least 10°.**

To secure the proper slip-resistant function of the flooring in conformity with the conclusion above, one has to keep the surface clean and free from excessive wear. Other properties were not subject to the tests.

5.2

The polyurethane flooring under test - **TPU tactile guiding strips, TPUP tactile guiding plates** - manufactured by OLEJÁR, spol. s r.o., Nižná Polianka 65, 086 36 Nižná Polianka, Slovakia, was classified according DIN51130, P CEN/TS 16165 (method B) into **Group R 10** during the test carried out according to DIN 51130 and can therefore be used to construct safe floors, for instance in storerooms, kitchens where food is defrosted and heated, in sanitary rooms, in rooms where packaged meat is sold, etc.);
and can also be used as Group R9 (to construct safe floors, for instance in rooms for medical diagnostic equipment, massage rooms, laboratories, etc.).
The flooring also **meets the requirements** specified in Art. 4.17 of **ČSN 74 4505 Floors – Common Provisions in accordance with** Article 21(2),(3) of **Regulation No. 268/2009 Coll., on technical requirements for products, for floors in all apartment and dwelling rooms** that must conform to **the value of slipping angle of at least 6°, and it also meets the requirements for floors in the parts of structures used by the public including shopping arcades and covered passageways** that must conform to **the value of slipping angle of at least 10°.**

To secure the proper slip-resistant function of the flooring in conformity with the conclusion above, one has to keep the surface clean and free from excessive wear. Other properties were not subject to the tests.

END OF REPORT

TZÚS TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
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IČ 00015679

FORVALTNING, DRIFT OG VEDLIKEHOLD

Teknisk info Forbo Surestep, Safestep mf:

Teknisk informasjon

Step oppfyller kravene I EN - ISO 10582 & EN 13845

			Surestep Original Surestep Star	Surestep Wood Surestep Stone Surestep Mineral Surestep Texture	Safestep R11	Safestep R12	Safestep Aqua	Surestep Laguna
	Total tykkelse	EN - ISO 24346	2,0 mm	2,0 mm	2,0 mm	2,0 mm	2,0 mm	2,0 mm
	Tykkelse på slitesjikt	EN - ISO 24340	0,7 mm	0,7 mm	0,7 mm	0,7 mm	0,7 mm	0,7 mm
	Offentlig - kraftig, meget kraftig	EN - ISO 10874	Klasse 34	Klasse 34	Klasse 34	Klasse 34	Klasse 34	Klasse 34
	Industri - vanlig, kraftig	EN - ISO 10874	Klasse 43	Klasse 43	Klasse 43	Klasse 43	Klasse 43	Klasse 43
	Kolleksjonsstørrelse		24 - 13	12 - 8 - 5 - 5	8	4	12	12
	Rullbredde	EN - ISO 24341	2,00 m	2,00 m	2,00 m	2,00 m	2,00 m	2,00 m
	Rullengde	EN - ISO 24341	20 - 27 m	20 - 27 m	20 - 27 m	20 - 27 m	20 - 27 m	20 - 27 m
	Total vekt	EN - ISO 23997	2,75 kg/m²	2,75 kg/m²	2,75 kg/m²	2,75 kg/m²	2,75 kg/m²	2,75 kg/m²
	Dimensjonstabil	EN - ISO 23999	< 0,1%	< 0,1%	< 0,1%	< 0,1%	< 0,1%	< 0,1%
	Inntrykksbestandighet	EN - ISO 24343-1	≤ 0,05 mm	≤ 0,05 mm	≤ 0,05 mm	≤ 0,05 mm	≤ 0,05 mm	≤ 0,05 mm
	Rullende stolhjul	EN 425	Egnet	Egnet	Egnet	Egnet	Egnet	Egnet
	Bruk i våtrom	EN 13533	Ja	Nei	Ja	Ja	Ja	Ja
	Lysbestandighet	EN - ISO 105 B-02	≥6	≥6	≥6	≥6	≥6	≥6
	Bøyelighet	EN - ISO 24344	ø 10mm	ø 10mm	ø 10mm	ø 10mm	ø 10mm	ø 10mm
	Sklihemmende egenskaper	EN 13845 Annex C	ESf	ESf	ESf	ESf	ESb	ESb / ESf
		EN 13845 Annex D 50.000 omdreininger <10% partikler slitt bort	Klasse 34/43	Klasse 34/43	Klasse 34/43	Klasse 34/43	Klasse 34/43	Klasse 34/43
		DIN 51130	R10	R10	R11	R12	R10	R10
		Din 51097					Klasse C	Klasse B
	Kjemisk motstand	EN-ISO 26987	Veldig bra	Veldig bra	Veldig bra	Veldig bra	Veldig bra	Veldig bra
	Elektrisk motstand	EN 1081 (R1)	> 1,10⁹ Ω	> 1,10⁹ Ω	> 1,10⁹ Ω	> 1,10⁹ Ω	> 1,10⁹ Ω	> 1,10⁹ Ω
	Step oppfyller kravene I EN 14041							EN 14041 CE 0290101-DoP-306
	Brannegenskaper	EN 13501-1	B_{fl}-s1	B_{fl}-s1	B_{fl}-s1	B_{fl}-s1	B_{fl}-s1	B_{fl}-s1
	Generering av kroppsspenning	EN 1815	< 2kV	< 2kV	< 2kV	< 2kV	< 2kV	< 2kV
	Varmeledningsevne	EN 12524	0,25 W/m,K	0,25 W/mK	0,25 W/mK	0,25 W/mK	0,25 W/mK	0,25 W/mK
	Sklihemmende egenskaper	EN 13893	DS: ≧0,30	DS: ≧0,30	DS: ≧0,30	DS: ≧0,30	DS: ≧0,30	DS: ≧0,30

Ved bruk av tapelim - VHB5925F:

3M

VHB™ Tapes

Technical Data October 2018

Product Description:

3M™ VHB™ Tapes provide the convenience and simplicity of a tape fastener and are ideal for use in many interior and exterior bonding applications. In many situations, they can replace rivets, spot welds, liquid adhesives and other permanent fasteners.

These 3M™ VHB™ Tapes are made with acrylic foam which is viscoelastic in nature. This gives the foam energy absorbing and stress relaxing properties which provides these tapes with their unique characteristics. The acrylic chemistry provides outstanding durability performance.

These tapes utilize a variety of specific foam, adhesive, color and release liner types to provide each product/family with specific features. These features can include adhesion to specific or a broad range of materials, conformability, high tensile strength, high shear and peel adhesion, resistance to plasticizer migration, and UL746C recognition. All 3M™ VHB™ Tapes have excellent durability and excellent solvent and moisture resistance.

The tapes included in this data page represent products most commonly used by customers. Please refer to "3M™ VHB™ Tape Specialty Tapes" technical data sheet for additional 3M™ VHB™ Tapes that may be required in special circumstances.

3M™ VHB™ Tape Products

4941 Family

This family utilizes multi-purpose acrylic adhesive on both sides of a conformable adhesive foam core. The adhesive provides excellent adhesion to a broad range of high and medium surface energy substrates including metals, glass, and a wide variety of plastics, as well as plasticized vinyl. The conformable adhesive foam core provides good contact, even with mismatched substrates. The combination of foam strength, conformability, and adhesion makes this family one of the most capable all-around 3M™ VHB™ tapes.

Tape Number	Color	Thickness in (mm)
4919F	Black	0.025 (0.6)
4926	Gray	0.015 (0.4)
4936(F)	Gray	0.025 (0.6)
4941(F)	Gray	0.045 (1.1)
4947F	Black	0.045 (1.1)
4956(F)	Gray	0.062 (1.6)
4979F	Black	0.062 (1.6)
4991	Gray	0.090 (2.3)
4991B	Black	0.090 (2.3)

5952 Family

This family utilizes modified acrylic adhesive on both sides of a very conformable adhesive foam core, providing adhesion the broadest range of substrates, including most powder coated paints.

Tape Number	Color	Thickness in (mm)
5906	Black	0.006 (0.15)
5907	Black	0.008 (0.20)
5908	Black	0.010 (0.25)
5909	Black	0.012 (0.30)
5915(P)	Black	0.016 (0.4)
5915WF	White	0.016 (0.4)
5925(P)	Black	0.025 (0.6)
5925WF	White	0.025 (0.6)
5930(P)	Black	0.032 (0.8)
5930WF	White	0.032 (0.8)
5952(P)	Black	0.045 (1.1)
5952WF	White	0.045 (1.1)
5958FR	Black	0.040 (1.0)
5962(P)	Black	0.062 (1.6)
5962WF	White	0.062 (1.6)

RP Family

This family utilizes multi-purpose acrylic adhesive on both sides of a conformable adhesive foam core. The adhesive provides good adhesion to a broad range of high and medium surface energy substrates including metals, glass, and a wide variety of plastics. The conformable adhesive foam core provides good contact, even with mismatched substrates

Tape Number	Color	Thickness in (mm)
RP16(F)	Gray	0.016 (0.4)
RP25(F)	Gray	0.025 (0.6)
RP32(F)	Gray	0.032 (0.8)
RP45(F)	Gray	0.045 (1.1)
RP62(F)	Gray	0.062 (1.6)

(P) or (F) after the product number designates that both a paper and film liner product version are available. [e.g. 4941 (paper liner) and 4941F (film liner), 5915 (film liner) and 5915P (paper liner). See page 2 for specific details.

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3M™ VHB™ Tapes

Typical Physical Properties **Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.**

3M™ VHB™ Tapes				Adhesive and Foam			Release Liner		
Family	Number	Color	Tape Thickness Inches (mm) Tolerance	Adhesive Type	Foam Type	Density lb/ft³ (kg/m³)	Type	Thickness Inches (mm)	Color
4941	4919F	Black	0.025 (0.6) ±15%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	4926	Gray	0.015 (0.4) ±15%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	4936	Gray	0.025 (0.6) ±15%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	4936F	Gray	0.025 (0.6) ±15%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	4941	Gray	0.045 (1.1) ±10%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	4941F	Gray	0.045 (1.1) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red
	4947F	Black	0.045 (1.1) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	4956	Gray	0.062 (1.6) ±10%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	4956F	Gray	0.062 (1.6) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	4979F	Black	0.062 (1.6) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	4991	Gray	0.090 (2.3) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	4991B	Black	0.090 (2.3) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
5952	5906	Black	0.006 (0.15) ±15%	Modified	Very Conf	45 (720)	PET	0.003 (0.08)	Clear
	5907	Black	0.008 (0.20) ±15%	Modified	Very Conf	45 (720)	PET	0.003 (0.08)	Clear
	5908	Black	0.010 (0.25) ±15%	Modified	Very Conf	45 (720)	PET	0.003 (0.08)	Clear
	5909	Black	0.012 (0.30) ±15%	Modified	Very Conf	45 (720)	PET	0.003 (0.08)	Clear
	5915	Black	0.016 (0.4) ±15%	Modified	Very Conf	43 (690)	PE Film	0.005 (0.13)	Red (printed)
	5915P	Black	0.016 (0.4) ±15%	Modified	Very Conf	43 (690)	PCK Paper	0.004 (0.10)	White (printed)
	5915WF	White	0.016 (0.4) ±15%	Modified	Very Conf	43 (690)	PE Film	0.005 (0.13)	Red (printed)
	5925	Black	0.025 (0.6) ±15%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5925P	Black	0.025 (0.6) ±15%	Modified	Very Conf	37 (590)	PCK Paper	0.004 (0.10)	White (printed)
	5925WF	White	0.025 (0.6) ±15%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5930	Black	0.032 (0.8) ±15%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5930P	Black	0.032 (0.8) ±15%	Modified	Very Conf	37 (590)	PCK Paper	0.004 (0.10)	White (printed)
	5930WF	White	0.032 (0.8) ±15%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5952	Black	0.045 (1.1) ±10%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5952P	Black	0.045 (1.1) ±10%	Modified	Very Conf	37 (590)	PCK Paper	0.004 (0.10)	White (printed)
	5952WF	White	0.045 (1.1) ±10%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5958FR	Black	0.040 (1.0) ±10%	Modified	Very Conf	50 (800)	PE Film	0.005 (0.13)	Red (printed)
	5962	Black	0.062 (1.6) ±10%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
	5962P	Black	0.062 (1.6) ±10%	Modified	Very Conf	37 (590)	PCK Paper	0.004 (0.10)	White (printed)
	5962WF	White	0.062 (1.6) ±10%	Modified	Very Conf	37 (590)	PE Film	0.005 (0.13)	Red (printed)
RP	RP16	Gray	0.016 (0.4) ±15%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	RP16F	Gray	0.016 (0.4) ±15%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	RP25	Gray	0.025 (0.6) ±15%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	RP25F	Gray	0.025 (0.6) ±15%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	RP32	Gray	0.032 (0.8) ±15%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	RP32F	Gray	0.032 (0.8) ±15%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	RP45	Gray	0.045 (1.1) ±10%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	RP45F	Gray	0.045 (1.1) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)
	RP62	Gray	0.062 (1.6) ±10%	Multi-Purp	Conform	45 (720)	Dk Paper	0.003 (0.08)	White (printed)
	RP62F	Gray	0.062 (1.6) ±10%	Multi-Purp	Conform	45 (720)	PE Film	0.005 (0.13)	Red (printed)

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3M™ VHB™ Tapes

Available Sizes

Tape Thickness Inches (mm)	Standard Length yards (meters)	Minimum Width Inches (mm)	Maximum Width Inches (mm)	Maximum Roll Length: Width 1/4" up to 3/8" (6.4mm up to 9.5mm) yards (meters)	Maximum Roll Length: Width >3/8" up to 1/2" (>9.5mm up to 12.7mm) yards (meters)	Maximum Roll Length: Width 1/2" and wider (12.7mm and wider) yards (meters)
<0.015 (0.4)	72 (65.8)	0.5 (13)	46 (1168)	N/A N/A	N/A N/A	See Note Below
0.015/0.016 (0.4)	72 (65.8)	0.25 (6)	48* (1219)	144 (131.7)	175 (160.0)	360 (329.2)
0.025 (0.6)	72 (65.8)	0.25 (6)	48* (1219)	72 (65.8)	108 (98.8)	175 (160.0)
0.032 (0.8)	72 (65.8)	0.25 (6)	48 (1219)	72 (65.8)	108 (98.8)	175 (160.0)
0.040 (1.0)	36 (32.9)	0.25 (6)	48 (1219)	72 (65.8)	108 (98.8)	144 (131.7)
0.045 (1.1)	36 (32.9)	0.25 (6)	48 (1219)	72 (65.8)	108 (98.8)	144 (131.7)
0.062 (1.6)	36 (32.9)	0.25 (6)	46 (1168)	72 (65.8)	72 (65.8)	108 (98.8)
0.090 (2.3)	36 (32.9)	0.25 (6)	46 (1168)	36 (32.9)	36 (32.9)	72 (65.8)

*Exception – 5915 (P) max. width 46 inches (1168 mm); 5925 (P) max. width 47 inches (1194 mm).

Note: 5952 family tapes thinner than 0.015 in (0.4 mm) have max. length 360 yd (329.2 m) for widths 1 in (25 mm) to 8 in (203 mm) and 180 yd (164.6 m) for all other widths.

Slitting Tolerance

Standard slitting tolerance ± 1/32 inch (± 0.031 inch, ± 0.79 mm).

Precision slitting with slitting tolerance of ± 1/64 inch (± 0.016 in., ± 0.41 mm) is available on select products with minimum order of full web increments.

Core Size

All products are provided on a 3 inch ID Core (76.2 mm)

Converted Parts

In addition to standard and custom roll sizes available from 3M through the distribution network, 3M™ VHB™ Tapes are also available in limitless shapes and sizes through the 3M Converter network. For additional information, contact 3M Converter Markets at 1-800-223-7427 or on the web at www.3M.com/converter.

Shelf Life

All 3M™ VHB™ Tapes have a shelf life of 24 months from date of manufacture when stored at 40°F to 100°F (4°C to 38°C) and 0-95% relative humidity. The optimum storage conditions are 72°F (22°C) and 50% relative humidity.

Performance of tapes is not projected to change even after shelf life expires; however, 3M does suggest that 3M™ VHB™ Tapes are used prior to the shelf life date whenever possible.

The manufacturing date is available on all 3M™ VHB™ Tape cores as the lot number. The lot number, typically a 4 digit code, is a Julian date (Y D D D). The first digit refers to the year of manufacture, the last 3 digits refer to the days after January 1. Example: A lot number of 9266 would translate to a date of manufacture of Sept. 22 (266th day of year) in 2009. On most products this is found as the 4 digits after the "9" following the product number. For tapes printed continuously around the core (e.g. 3M™ VHB™ Tape 5952 family) the lot number typically will be the string of 4 digits preceding the product number.

Special Cases:

Plasticized Vinyl – Plasticizers compounded in soft vinyl can migrate into adhesives and significantly change their performance characteristics. 3M™ VHB™ Tapes 4941 family has very good plasticizer resistance and adhesion to many vinyl formulations. Because of the wide variation in vinyl formulations, however, evaluation by the user must be conducted with the specific vinyl used to ensure that performance will be satisfactory over time. Problems related to plasticizer migration can often be predicted by accelerated aging of assembled parts at 150°F (66°C) for one week).

3M™ VHB™ Tapes

Typical Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ VHB™ Tapes				Dynamic Adhesion Performance		
Family	Product Number	Color	Thickness Inches	90° Peel Adhesion lb/in N/cm	Normal Tensile lb/in² kPa	Dynamic Overlap Shear lb/in² kPa
4941	4919F	Black	0.025	17 (30)	90 (620)	80 (550)
	4926	Gray	0.015	14 (25)	95 (660)	90 (620)
	4936(F)	Gray	0.025	17 (30)	90 (620)	80 (550)
	4941(F)	Gray	0.045	22 (39)	85 (590)	70 (480)
	4947F	Black	0.045	22 (39)	85 (590)	70 (480)
	4956(F)	Gray	0.062	22 (39)	80 (550)	70 (480)
	4979F	Black	0.062	22 (39)	80 (550)	70 (480)
	4991	Gray	0.090	22 (39)	70 (480)	65 (450)
	4991B	Black	0.090	22 (39)	70 (480)	65 (450)
5952	5906	Black	0.006	9 (16)	100 (690)	100 (690)
	5907	Black	0.008	10 (18)	100 (690)	100 (690)
	5908	Black	0.010	12 (21)	100 (690)	100 (690)
	5909	Black	0.012	12 (21)	100 (690)	100 (690)
	5915(P)	Black	0.016	14 (25)	90 (620)	90 (620)
	5915WF	White	0.016	14 (25)	90 (620)	90 (620)
	5925(P)	Black	0.025	17 (30)	90 (620)	90 (620)
	5925WF	White	0.025	17 (30)	90 (620)	90 (620)
	5930(P)	White	0.032	19 (33)	90 (620)	85 (590)
	5930WF	Black	0.032	19 (33)	90 (620)	85 (590)
	5952(P)	Black	0.045	22 (39)	90 (620)	80 (550)
	5952WF	White	0.045	22 (39)	90 (620)	80 (550)
	5958FR	Black	0.040	20 (35)	100 (690)	100 (690)
	5962(P)	Black	0.062	22 (39)	90 (620)	80 (550)
	5962WF	White	0.062	22 (39)	90 (620)	80 (550)
RP	RP16(F)	Gray	0.016	12 (21)	95 (660)	90 (620)
	RP25(F)	Gray	0.025	17 (30)	90 (620)	80 (550)
	RP32(F)	Gray	0.032	18 (32)	85 (590)	75 (520)
	RP45(F)	Gray	0.045	20 (35)	85 (590)	70 (480)
	RP62(F)	Gray	0.062	20 (35)	80 (550)	70 (480)

90° Peel Adhesion - Based on ASTM D3330 -To stainless steel, room temperature, jaw speed 12 in/min (304.8 mm/min). Average force to remove is measured. 72 hour dwell.

Normal Tensile (T-Block Tensile) - ASTM D-897 - To aluminum, room temperature, 1 in² (6.45 cm²), jaw speed 2 in/min (50.8 mm/min) Peak force to separate is measured. 72 hour dwell.

Dynamic Overlap Shear - ASTM D-1002 - To stainless steel, room temperature, 1 in² (6.45 cm²), jaw speed 0.5 in/min (12.7 mm/min) Peak force to separate is measured. 72 hour dwell.

3M™ VHB™ Tapes

Typical Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ VHB™ Tapes				Static Shear				Temperature Tolerance	
Family	Product Number	Color	Thickness Inches	72°F (22°C)	150°F (66°C)	200°F (93°C)	250°F (121°C)	Short Term (Minutes, Hours) °F (°C)	Long Term (Days, Weeks) °F (°C)
4941	4919F	Black	0.025	1000	500	500		300 (149)	200 (93)
	4926	Gray	0.015	1000	500	500		300 (149)	200 (93)
	4936(F)	Gray	0.025	1000	500	500		300 (149)	200 (93)
	4941(F)	Gray	0.045	1000	500	500		300 (149)	200 (93)
	4947F	Black	0.045	1000	500	500		300 (149)	200 (93
	4956(F)	Gray	0.062	1000	500	500		300 (149)	200 (93)
	4979F	Black	0.062	1000	500	500		300 (149)	200 (93)
	4991	Gray	0.090	1000	500	500		250 (121)	200 (93)
	4991B	Black	0.090	1000	500	500		250 (121)	200 (93)
5952	5906	Black	0.006	1000	500	500	250	300 (149)	250 (121)
	5907	Black	0.008	1000	500	500	250	300 (149)	250 (121)
	5908	Black	0.010	1000	500	500	250	300 (149)	250 (121)
	5909	Black	0.012	1000	500	500	250	300 (149)	250 (121)
	5915(P)	Black	0.016	1000	500	500	250	300 (149)	250 (121)
	5915WF	White	0.016	1000	500	500	250	300 (149)	250 (121)
	5925(P)	Black	0.025	1000	500	500	250	300 (149)	250 (121)
	5925WF	Black	0.032	1000	500	500	250	300 (149)	250 (121)
	5930(P)	Black	0.032	1000	500	500	250	300 (149)	250 (121)
	5930WF	White	0.032	1000	500	500	250	300 (149)	250 (121)
	5952(P)	Black	0.045	1000	500	500	250	300 (149)	250 (121)
	5952WF	White	0.045	1000	500	500	250	300 (149)	250 (121)
	5958FR	Black	0.040	1000	350	250		300 (149)	200 (93)
	5962(P)	Black	0.062	1000	500	500	250	300 (149)	250 (121)
	5962WF	White	0.062	1000	500	500	250	300 (149)	250 (121)
RP	RP16(F)	Gray	0.016	1000	500	500		250 (121)	200 (93)
	RP25(F)	Gray	0.025	1000	500	500		250 (121)	200 (93)
	RP32(F)	Gray	0.032	1000	500	500		250 (121)	200 (93)
	RP45(F)	Gray	0.045	1000	500	500		250 (121)	200 (93)
	RP62(F)	Gray	0.062	1000	500	500		250 (121)	200 (93)

Static Shear - ASTM D3654 - To stainless steel, tested at various temperatures and gram loadings. 0.5 in² (3.23 cm²). Will hold listed weight for 10,000 minutes (approximately 7 days). Conversion: 1500 g/0.5 in² equals 6.6 lb/in²; 500 g/0.5 in² = 2.2 lb/in².

Short Term Temperature Tolerance - No change in room temperature dynamic shear properties following 4 hours conditioning at indicated temperature with 100 g/static load. (Represents minutes, hours in a process type temperature exposure).

Long Term Temperature Tolerance - Maximum temperature where tape supports at least 250 g load per 0.5 in² in static shear for 10,000 minutes. (Represents continuous exposure for days or weeks).

3M™ VHB™ Tapes

Additional Typical Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

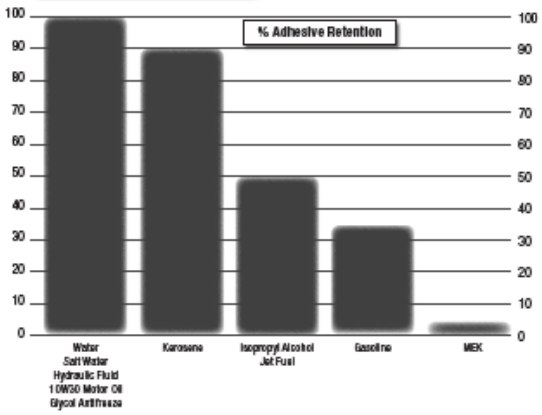
	3M™ VHB™ Tape 4941	3M™ VHB™ Tape 5952	Units	Test Standard
Dielectric Constant	2.29 1.99	2.14 1.95	at 1 kHz at 1MHz	ASTM D150 ASTM D150
Dissipation Factor	0.0245 0.0374	0.0065 0.0506	at 1 kHz at 1MHz	ASTM D150 ASTM D150
Dielectric Breakdown Strength	14 (360)	18 (455)	V/µm (V/mil)	ASTM D140
Thermal Conductivity (k value)	0.08 (0.5)	0.05 (0.4)	W/mK (BTU•in/hr•ft²•°F)	
Volume Resisitivity	2.1×10^{14}	2.5×10^{14}	Ω-cm	ASTM D257
Surface Resisitivity	2.7×10^{14}	$>10^{16}$	Ω/sq	ASTM D257
Water Vapor Transmission Rate	25.6	37.1	g/m²•day	ASTM F1249 at 38°C/100% RH
Thermal Properties of Modeling				
Thermal Coefficient of Expansion	180 (100)		10^{-6} m/m/°C (10^{-6} in/in/°F)	
Shear Modulus (at 25°C, 1 Hz)	3×10^{5}		Pa	

3M™ VHB™ Tapes
UL746C Listings - File MH 17478
Category QOQW2 Component - Polymeric Adhesive Systems, Electrical Equipment

3M™ VHB™ Tapes/ Product Families	Substrates	Temperature Rating Minimum	Maximum
4919F, 4926, 4936, 4936F, 4941, 4941F, 4947F, 4956, 4956F, 4979F	Ceramic	-35°C	110°C
	Aluminum, Galvanized Steel, Stainless Steel, Enameled Steel, Nickel Coated ABS, Glass (with or without Silane Coating) PVC, Glass/Epoxy, PBT, Polycarbonate, Acrylic/Polyurethane Paint, Polyester Paint	-35°C	90°C
	ABS	-35°C	75°C
4991	Polycarbonate, Aluminum, Acrylic/ Polyurethane Paint, Polyester Paint	-35°	90°C
5915, 5915P, 5915WF, 5925, 5925P, 5925WF, 5930, 5930P, 5930WF, 5952, 5952P, 5952WF, 5962, 5962P, 5962WF	Polycarbonate, Primer 94 Coated Polycarbonate, Aluminum, Acrylic/ Polyurethane Paint, Galvanized Steel, Polyester Paint, Epoxy Paint, Silane Coated Glass, Uncoated Glass, Stainless Steel, Enameled Steel, Glass Epoxy, Polybutylene Terephthalate, Nylon, Polyphenelene Ether (PPE), Acrylic	-35°C	90°C
	Rigid PVC, ABS	-35°C	75°C
5952, 5952P, 5952WF	Cellulose Acetate Butyrate	-35°C	90°C
RP16	Aluminum, Silane Coated Glass	-35°C	90°C
	PVC, ABS	-35°C	75°C
RP16, RP25, RP32, RP45, RP62	Galvanized Steel, Enameled Steel, Nylon, Polycarbonate, Glass Epoxy, Phenolic, PPE/PS Blend, PBT, Epoxy Paint, Polyester Paint, Adhesion Promoter 111 Coated Epoxy Paint, Promoter 111 Coated Polyester Paint, Acrylic Urethane Paint, Epoxy/ Polyester Paint	-35°C	90°C
RP62	Stainless Steel, Glass, Acrylic	-35°C	90°C
	PVC, ABS	-35°C	75°C

A current list can be found at www.ul.com (select certifications, search file MH 17478)

Solvent and Fuel Resistance



Test Method

- Tape between stainless steel and aluminum foil
- 72 hours dwell at room temperature
- Solvent immersion for 72 hours
- Test within 45 minutes after removing from solvent
- 90° peel angle
- 12 in/min rate of peel
- Peel adhesion compared to control

Note: Continuous submersion in chemical solutions is not recommended. The above information is presented to show that occasional chemical contact should not be detrimental to tape performance in most applications in ordinary use.

Burn Characteristics 3M™ VHB™ Tape 5958FR
Meets FAR 25.853 (a) 12 second vertical burn, Appendix F, Part I (a)(ii)
Meets NBS Smoking Density (ASTM F814/E662)
Meets Toxicity (Draeger Tube ABD0031, AITM 3.0005)

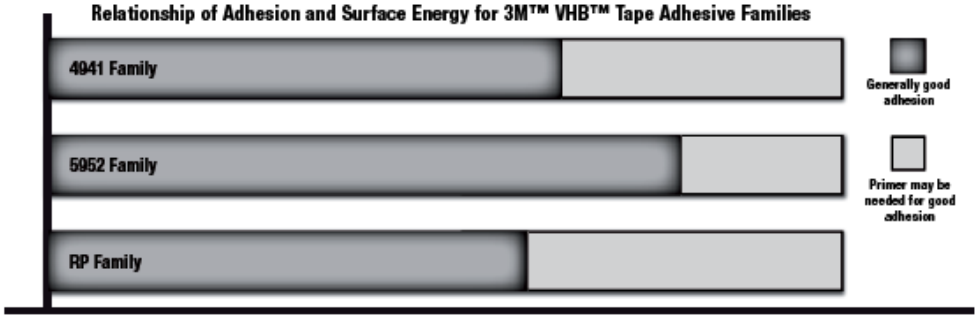
3M™ VHB™ Tapes

Design and Tape Selection Considerations

► **Choose the right tape for the substrate:** Adhesives must flow onto the substrate surfaces in order to achieve intimate contact area and allow the molecular force of attraction to develop. The degree of flow of the adhesive on the substrate is largely determined by the surface energy of the substrate.

This illustration demonstrates the effect of surface energy on adhesive interfacial contact. High surface energy materials draw the adhesive closer for high bond strength.

Relationship of Adhesion and Surface Energy for 3M™ VHB™ Tape Adhesive Families



Aluminum	Polyimide	ABS	PVA	EVA
Stainless Steel	Phenolic	Polycarbonate	Polystyrene	Polyethylene
Copper	Nylon	PVC	Acetal	Polypropylene
Zinc	Alkyd Enamel	PPE	PVDF Paint	PVF
Tin	Polyester	Acrylic	Powder Paint	Silicone
Lead	Epoxy Paint	PU Enamel		PTFE
Anodized Aluminum	Polyurethane	Powder Paint		
Glass				

NOTES: There are a wide variety of formulations, surfaces finishes and surface treatments available on substrate materials which can affect adhesion. This chart is intended to provide only a rough estimate of the adhesion levels which can be expected on some common materials relative to a reference surface such as aluminum.

Foam type can affect and/or limit maximum adhesive strength.

► **Use the right tape thickness:** The necessary thickness of tape depends on the rigidity of substrates and their flatness irregularity. While the 3M™ VHB™ Tapes will conform to a certain amount of irregularity, they will not flow to fill gaps between the materials. For bonding rigid materials with normal flatness, consider use of tapes with thickness of 45 mils (1.1 mm) or greater. As the substrate flexibility increases thinner tapes can be considered.

► **Use the right amount of tape:** Because 3M™ VHB™ Tapes are viscoelastic by nature their strength and stiffness is a function of the rate at which they are stressed. They behave stronger with relatively faster rate of stress load (dynamic stresses) and will tend to show creep behavior with stress load acting over a long period of time (static stresses). As a general rule, for **static loads**, approximately four square inches of tape should be used for each pound (57 cm^2 of tape per kg) of weight to be supported in order to prevent excessive creep. For **dynamic loads**, the dynamic performance characteristics provided on page 4 should be useful, factoring in the appropriate safety factors.

► **Allow for thermal expansion/contraction:** 3M™ VHB™ Tapes can perform well in applications where two bonded surfaces may expand and contract differentially. Assuming good adhesion to the substrates, the tapes can typically tolerate differential movement in the shear plane up to 3 times their thickness.

► **Bond Flexibility:** While an advantage for many applications where allowing differential movement is a benefit, the tape bonds are typically more flexible than alternative bonding methods. Suitable design modifications or periodic use of rigid fasteners or adhesives may be needed if additional stiffness is required.

► **Severe Cold Temperature:** Applications which require performance at severe cold temperatures must be thoroughly evaluated by the user if the intended use will subject the tape product to high impact stresses. A technical bulletin "3M™ VHB™ Tape Cold Temperature Performance" (70-0707-3991-0) is available for additional information.

3M™ VHB™ Tapes

Application Techniques

► **Clean:** Most substrates are best prepared by cleaning with a 50:50 mixture of isopropyl alcohol (IPA*) and water prior to applying 3M™ VHB™ Tapes.

Exceptions to the general procedure that may require additional surface preparation include:

- **Heavy Oils:** A degreaser or solvent-based cleaner may be required to remove heavy oil or grease from a surface and should be followed by cleaning with IPA/water.
- **Abrasion:** Abrading a surface, followed by cleaning with IPA/water, can remove heavy dirt or oxidation and can increase surface area to improve adhesion.
- **Adhesion Promoters:** Priming a surface can significantly improve initial and ultimate adhesion to many materials such as plastics and paints.
- **Porous surfaces:** Most porous and fibered materials such as wood, particleboard, concrete, etc. need to be sealed to provide a unified surface.
- **Unique Materials:** Special surface preparation may be needed for glass and glass-like materials, copper and copper containing metals, and plastics or rubber that contain components that migrate (e.g. plasticizers).

Refer to 3M Technical Bulletin "Surface Preparation for 3M™ VHB™ Tape Applications" for additional details and suggestions. (70-0704-8701-5)

***Note:** These cleaner solutions contain greater than 250 g/l of volatile organic compounds (VOC). Please consult your local Air Quality Regulations to be sure the cleaner is compliant. When using solvents, be sure to follow the manufacturer's precautions and directions for use when handling such materials.

► **Pressure:** Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and helps improve bond strength. Typically, good surface contact can be attained by applying enough pressure to insure that the tape experiences approximately 15 psi (100 kPa) pressure. Either roller or platen pressure can be used. Note that rigid surfaces may require 2 or 3 times that much pressure to make the tape experience 15 psi.

► **Temperature:** Ideal application temperature range is 70°F to 100°F (21°C to 38°C). Pressure sensitive adhesives use viscous flow to achieve substrate contact area. Minimum suggested application temperatures:

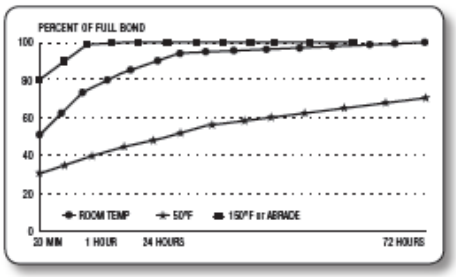
- 50°F (10°C): 3M™ VHB™ Tapes 5952 and RP families.
- 60°F (15°C): 3M™ VHB™ Tape 4941 family.

Note: Initial tape application to surfaces at temperatures below these suggested minimums is not recommended because the adhesive becomes too firm to adhere readily. However, once properly applied, low temperature holding is generally satisfactory.

To obtain good performance with all 3M™ VHB™ Tapes, it is important to ensure that the surfaces are dry and free of condensed moisture.

► **Time:** After application, the bond strength will increase as the adhesive flows onto the surface (also referred to as "wet out"). At room temperature approximately 50% of ultimate bond strength will be achieved after 20 minutes, 90% after 24 hours and 100% after 72 hours. This flow is faster at higher temperatures and slower at lower temperatures. Ultimate bond strength can be achieved more quickly (and in some cases bond strength can be increased) by exposure of the bond to elevated temperatures (e.g. 150°F [66°C] for 1 hour). This can provide better adhesive wetout onto the substrates. Abrasion of the surfaces or the use of primers/ adhesion promoters can also have the effect of increasing bond strength and achieving ultimate bond strength more quickly.

Bond Typical Build vs. Time



3M™ VHB™ Tapes

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ISO 9001

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

3M

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