LICK AUTOMATED PLANET FINDER ENCLOSURE TECHNICAL DESCRIPTION DOCUMENT

CI No. EMC-07653-01

November 2006

DOCUMENT CONTROL

Prepared	Signed	Date
Checked	Signed	Date
Approved	Signed	Date

Issue	Date	Description	Checked	Approved

ECO # Index	

CONTENTS

1 SCOPE

1.1 APPLICATION

This document defines the functional specifications required which apply to components of the Lick APF Telescope Enclosure, EOS IceStorm series II variant.

1.2 QUALITY MANAGEMENT

EOS is certified to ISO 9001 and is subject to regular internal and external audit.

1.3 RELEVANT DOCUMENTATION

CI Number	Title
AD-07653	Lick APF IceStorm 2 enclosure assembly
TS-500585	Fastener assembly procedure
WD-500906	Azimuth – Wiring diagram
WD-500907	Shutter Control – Wiring diagram
WD-500908	Safety / DIO – Wiring diagram
WD-500046	Vent control – Wiring diagram
WD-500910	Power supply– Wiring diagram
WD-500628	FCU1 control– Wiring diagram
WD-500630	FCU2 control– Wiring diagram
WD-500632	FCU3 control – Wiring diagram
WD-500905	Dome control cabinet– Wiring diagram

2 ENCLOSURE FUNCTIONAL SPECIFICATIONS

2.1 FASTENERS

Unless otherwise stated, metric fasteners with coarse ISO thread are used. Screws and bolts of size M10 or greater are grade/class 8.8. Nuts and washers are as specified on EOS assembly drawings. For tightening procedures, refer to Fastener Assembly Procedure - TS-500585-01.

2.2 RING WALL

2.2.1 Steel Components

The steel components are manufactured from mild steel. The components are finished with Ameron Amercoat 307 zinc-rich primer, as per Appendix A. Note that before any welding modifications or repairs can be made, this primer must be completely removed from the weld area.

Small non-structural interior components may be powdercoated.

2.2.2 Cladding

Strammit Longspan is used for the external cladding of the ringwall. The cladding has a base material thickness (BMT) of 0.42 mm, and is finished with the Colorbond process. The internal cladding is Strammit Minirib (Colorbond, 0.42 mm BMT). The colour of the internal cladding is off-white (now replaced by Surfmist). Full technical specifications for Longspan and Minirib cladding are given in Appendix B

Both the external and internal cladding are pre-finished with the Colorbond process. If the surface requires touch-up painting, a good-quality water-based acrylic paint may be used.

The internal and external cladding are fixed to the ringwall structure using 50mm, 500 series (fine thread, extended drill) self-drilling Tek-screws.

2.2.3 Sealing

Protrusions through the ringwall are sealed using 235mm Dek-strip (DS10-235) flashing. The flashing is secured to the ringwall using 14-20 ×22mm Tek-screws. A datasheet for the flashing is included in Appendix C.

Neutral-cure acid-free silicon is used for additional sealing of small gaps.

2.2.4 Insulation

The ringwall cavity is insulated with locally sourced fibreglass batts. With installed insulation installed to rating specified in Enclosure technical specifications.

2.3 ENTRANCE BALCONY

2.3.1 Platform Structure

The entrance balcony structure is fabricated from STEEL SPEC mild steel. Except where noted below, the steel components are finished with Ameron Amercoat 307 zinc-rich primer followed by Ameron PSX 700 top coat (white). See Appendix A.

2.3.2 Floor Grating

The entrance balcony floor grating is made from Preslock P30B-325 grating, with galvanised finish.

2.3.3 Stairs and Stair Hand-Rails

The entrance balcony stairs are built using a combination of, off-the-shelf components and custom fabricated parts. The stair treads are manufactured by Webforge (specification:T2, C325, MSG, 245 mm wide × 900mm long). The stair handrails, although custom-fabricated, include off the shelf stanchions. These stanchions are manufactured by Webforge and are of the angle-mounted (AM) type. Both the stair treads and stanchions have a galvanised finish. Note that the hand-rail of the platform proper is painted, not galvanised.

Further information on both the stair handrails and stair treads in provided in Appendix E.

2.4 SERVICE BALCONY

2.4.1 Service Balcony Structure

The service balcony structure is made from mild steel, and is finished with Ameron Amercoat 307 zinc-rich primer followed by Ameron PSX 700 top coat (white). See Appendix A.

2.4.2 Service Balcony Floor Grating

The floor grating is made from Preslock P30B-325 grating, with galvanised finish.

2.4.3 Service Crane (customer option not supplied for Lick APF facility)

The recommended service crane is a Palfinger PC3300B model, fitted with a Pullmaster PL2 hydraulic winch and a 3-phase 240 V hydraulic power-pack. The maximum safe working load for the service crane is 200 kg. The hydraulic fluid used is Castrol Hyspin 46 or equivalent. Full specifications for both the crane and winch are given in Appendix F.

2.5 LEVEL 1

2.5.1 Steel Components

Steel components associated with level 1 are fabricated from mild steel, and are finished with Ameron Amercoat 307 zinc-rich primer followed by Ameron PSX 700 top coat (white) (see Appendix A).

Small non-structural interior components may be powdercoated.

2.5.2 Flooring

The level 1 floor is made up of two parts—the stationary floor and the rotating floor. The stationary floor is attached to the ringwall, while the rotating floor is part of the level 1 structure proper. The flooring material for both the stationary and rotating floors is 25mm thick F14 structural grade plywood, H2 treated with CD finish (manufactured according to AS/NZS 2269:1994 Plywood—Structural). The timber flooring panels are attached to the steel frame below using zinc coated 10-24 × 50mm countersunk head Tek-screws. The timber floor is finished firstly with Sheltercoat Roof & Deck primer, then Roof & Deck 2-part paint see Appendix G.

2.5.3 Insulation

Dow Corning Blue Styrofoam insulation is used in the wall cavities of the level 1 stair assembly, and in the cavity between the level 1 ceiling and the level 2 floor.

Details of the foam are provided in Appendix H.

2.5.4 Ceiling

The level 1 ceiling is made from 12 mm thick chipboard with a melamine finish to one side only. The ceiling panels are fixed with self drilling self taping screws to tack welded battens (welded to the base of the level 2 floor). The joins between the ceiling panels are concealed using white HM7 divisional moulding (see Appendix I for full product details).

2.5.5 Entrance Door Lock

The entrance door has a Schlage D-Series keyed lever lock (ND50PD RHO 626). The lock has a Rhodes style lever with satin chromium plated finish. Full product information is included in Appendix J.

2.5.6 Azimuth Cable Chain

There are two cable chains configured as telescope side and enclosure side. The cable chains are produced to specification by Telmo Australia, using Brevetti Stendalto SR308-B250/4 components. Data sheets for Brevetti Stendalto cable chains are provided in Appendix K.

2.5.7 Electrical Cabinet

2.5.7.1 Azimuth Drive Motor Controllers

The azimuth drive motors are controlled using Baldor ZD18H203-E vector controllers. A specification sheet is provided in Appendix L.

2.5.7.2 Shutter Drive Motor Controllers

The shutter drive motors are controlled using Baldor FDH2A07TR-RC20 FlexDrive-II AC servo drive. A specification sheet is provided in Appendix L.

2.5.7.3 Cables

Power is supplied to the azimuth and shutter motors through Baldor 20 Amp power cable. Feed back for Azimuth control is through CBL155ZZD-2 encoder cable. The shutter drive motors and controller are connected with Baldor CBL044-501 resolver cable cable.

2.6 LEVEL 2

2.6.1 Steel Components

Steel components associated with level 2 are fabricated fromrolled mild steel sections, and are finished with Ameron Amercoat 307 zinc-rich primer followed by Ameron PSX 700 top coat (white) (see Appendix A). Moving parts (that is, those related to the azimuth drives and azimuth support bogeys) are finished in safety yellow colour.

Small non-structural interior components may be powdercoated.

2.6.2 Flooring

The flooring material for the level 2 floor is 25mm thick F14 structural grade plywood, H2 treated with CD finish (manufactured according to AS/NZS 2269:1994 Plywood—Structural). The timber flooring panels are attached to the steel frame below using zinc coated 10-24 × 50mm countersunk head Tek-screws. The timber floor is finished firstly with Sheltercoat Roof & Deck primer, then Roof & Deck 2-part paint, see Appendix G.

2.6.3 Azimuth Drive Assembly

2.6.3.1 Azimuth Drive Motors and Gearboxes

The azimuth drives use Baldor 2kW 1750 RPM flux vector motors (ZDNM3661, wound for 3-phase 240 V power. See Appendix L), fitted with Mayr M32 brakes. The motors are coupled to MR2180 16.0:1 coaxial gear reducers, and then Rossi MRC21140-112 gearboxes.

2.6.3.2 Lubricants

The azimuth drive gearboxes use extreme pressure, ISO viscosity grade 320, synthetic oil (e.g. Shell Omala 320). This oil is intended to last the life of the gearboxes.

2.6.3.3 Azimuth Drive Wheels

The azimuth drive wheels are manufactured to EOS specifications (AD-03623). The drive wheels comprise a Fenner weld-on taper-lock hub (Fenner part number 08592507), fabricated rim and a cast polyurethane tyre(70 durometer, Shore D).

2.6.3.4 Azimuth Guide Wheels

The azimuth guide wheels are supplied to specification by Raeder-Vogel. The guide wheels have a galvanized and chromated hub with Vulkollan tyres. The Raeder-Vogel specification is 173/140/076/5/40, with SKF 6208-2RS1 ball bearing and distance bushing. Performance specifications are given in Appendix M.

2.6.3.5 Pinch Rollers

The azimuth pinch rollers are manufactured to EOS specifications (AD-04222) and consist of a cast iron hub with a cast polyurethane tyre (70 durometer, Shore D).

2.6.3.6 Marsh Mellows

The azimuth drive assemblies use Firestone Marsh Mellow brand rubber springs. The particular model used is 0187 (outside diameter 140 mm, inside diameter 51 mm, free height 178 mm) See Appendix N for data sheet.

2.6.4 Azimuth Support Wheel Assembly

2.6.4.1 Azimuth Support Wheels

The azimuth support wheels are supplied to specification by Raeder-Vogel. The support wheels have a galvanized and chromated hub (including grease nipple) with a Vulkollan tyre (a proprietary polyurethane elastomer developed by Bayer). The Raeder-Vogel specification is 173/246/102/65 X 19.8 (item number 5715.2178.00A)

2.6.4.2 Marsh Mellows

The Azimuth support wheel assembly use Firestone Marsh Mellow brand rubber springs. The particular model used in 0187 (outside diameter 140 mm, inside diameter 51 mm, free height 178 mm) See appendix N for data sheet.

2.7 INTERFACE BEAM

2.7.1 Shock Absorbers

The two shock absorbers used in the interface beam assembly are CJAC AD64050 units. See Appendix O for data sheet.

2.7.2 Potentiometer

The interface beam utilizes a 450 mm stroke variable resistor, with self-aligning bearing, SLS230/450/18K/L/50/01.

2.7.3 Proximity Switches

The interface beam assembly uses Omron E2E-X18MEI proximity switches (3 wire DC, M30, NPN Unshielded, 18mm sensing distance).

2.8 LEVEL 3/OBSERVING SPACE

2.8.1 Steel Components

Steel components associated with level 3 are fabricated from mild steel, and are finished with Ameron Amercoat 307 zinc-rich primer followed by Ameron PSX 700 top coat (black) (see Appendix A). Note that the arch-beams are a special case, being finished with a white top-coat, except for the under-surface, which is finished in matt black.

Small non-structural interior components (eg corner pocket seals) may be powdercoated.

2.8.2 Floor Grating and Hatches

The floor grating is made from Preslock P30B-325 grating, with galvanised finish.

2.8.3 Hatch Gas-Struts

The gas struts that support the level 3 hatches are supplied by Strut Re-Gas to specification C12 325750. The struts are 750 mm long, with a 325 mm stroke and a 12 mm shaft diameter. Each strut is primed to 800 N.

2.9 FIBREGLASS CLADDING

The fiberglass cladding panels are insulated with Dow Corning blue Styrofoam. Specifications are provided in Appendix H. The Styrofoam is covered with Contego intumescent latex passive fire barrier. Specifications and test results for the Contego passive fire barrier are provided in Appendix P.

The inside surface of each panel is finished with black Nuplex Iso-flo 319 flow coat.

2.10 VENT DOORS

2.10.1 Left Vent Door Drive

The left vent doors are moved using a Lift-Master right-opening garage door motor (Model number SD3321LR). See Appendix Q for specifications.

2.10.2 Right Vent Door Drive

The right vent doors are moved using a Lift-Master left-opening garage door motor (Model number SD3321LL). See Appendix Q for specifications.

2.11 SHUTTER ASSEMBLIES

2.11.1 Aluminium Components

The shutter assemblies are fabricated from 6061-T6 aluminium. No welding modifications may be made to the shutter assemblies, as this will result in weakening of the metal and thus the structure.

The aluminium components of the shutter assemblies are finished with Ameron Multi-etch 302/Amercoat 385/Iso-free 977, (see Appendix A). The main and transverse beams are finished with a white top coat, followed by a matt black coat (Sprayed matte black by customer). Moving parts are finished in safety yellow.

Threaded holes in aluminium components use Helicoil thread inserts.

2.11.2 Drives and Gearboxes

Each of the shutter drives use a Baldor servo brake motor (BSM90N-3150BA, data sheet is provided in Appendix L) coupled to a Demag gearbox WUH 50 DL-B14.0-50-94.3.

2.11.3 Lubricants

The gearboxes are sealed units, supplied with extreme pressure, ISO viscosity grade 220 synthetic oil. This oil is intended to last the life of the gearboxes.

2.11.4 Shutter Chain

The shutter drives use S-Y brand 16B2 (BS 1") Neo-coated duplex chain. See Appendix R.

2.11.5 Shutter Support Roller

A Demag wheel block (DRS 112 A30 F 0 0 K X X) is used for the shutter support rollers. The rollers have a Hydropur tyre with a custom running profile (2° crown).

2.11.6 Shutter Guide Rollers

The shutter guide rollers are made by Raeder-Vogel, and are specified as Pevolon (a proprietary polyamide thermoplastic) 130/PA/70/035/5/20B.

2.11.7 Cable Chain

Each shutter assembly has one Brevetti Stendalto (SR316-B78/3Sp). The cable chains are assembled to specification by Telmo Australia. A data sheet for the Brevetti Stendalto cable chain is provided in Appendix K Note that the SR316 series has been superceded by SR326.

2.11.8 Proximity/Limit Switches

Two kinds of switches are used in the shutter assemblies—roller–lever limit switches and proximity switches. The limit switches are Honeywell GLAC-01A2B, adjustable roller lever type. The proximity switches are Omron E2E-X18MEI (3 wire DC, M30, NPN unshielded, 18mm sensing distance).

2.11.9 Shock Absorbers

The inter-shutter and end travel shock absorbers are CJAC AD-4250 units. A data sheet is provided in Appendix O.

2.11.10 Shutter Heater Cables

The shutter cable heater system is supplied by LMI Manufacturing Group, and includes:

4 × Power connect kit (product number 386505)

2 × Splice and tee kit (product number 386513)

2 × End seal kit (product number 386521)

2 × 180' roll gutter application tape (product number 386546).

1 × 250' roll TW6-1CR 120 volt heater cable (product number 386476-250)

See Appendix S.

2.12 COOLING (CUSTOMER OPTION)

The cooling system is fully specified in document FS-07726. Partial specifications of the components within the system are given in the following pages.

2.12.1 Control Valves

The flow of coolant in the system is controlled using Siemens valves coupled with valve actuators. The valves are also fitted with stem heaters. The following components are used in the system:

- Siemens threaded 3-port control valve VXG41.1401
- Siemens threaded 2-port control valve VVG41.11
- Siemens control valve stem heater ASZ6.5
- Siemens control valve actuator SQX62

The valve actuators and stem heaters have an operating voltage of AC 24 V. Data sheets are provided in Appendix T.

2.12.2 Circulating Fans

The two circulating fans in the observing space are manufactured by Fantech (specification AP404AP5/13). The fans are of the axial flow tube type, with 400 mm fan diameter. The motors are specially wound for 240 V 60 Hz single phase power. For full performance requirements refer to document FS-07726.

2.12.3 Chiller

The chiller is customer supplied. For details contact the UCO site manager of the Lick APF facility

2.12.4 Fan–Coil Units

Three fan–coil units are used in the cooling system. Each is designed to run on 240 V phase–phase connection power, Other power variants are available. For full performance requirements refer to document FS-07726.

2.12.5 Pipe Heaters

Two pipe heaters are used in the cooling system. As with the chiller and fan–coil units, the pipe heaters are designed to run on is on 240 V phase–phase connection power. For full performance requirements refer to document FS-07726.

Appendix A. Ameron paint specifications

For steel components
For aluminium components

Paint finishes for steel components

Ameron Amercoat 307 zinc-rich primer only

1st coat:	Ameron Amercoat 307	60–75 µm dry-film thickness

Ameron Amercoat 307 zinc-rich primer/Ameron PSX 700 siloxane

Surface preparation: Class 2 ½ blast cleaning		
1st coat:	Ameron Amercoat 307	60–75 µm dry-film thickness
2nd coat:	Ameron PSX 700	100–125 µm dry-film thickness

Note that if modifications or repairs are to be made to steel components, the primer must be removed completely from the weld area.

Datasheets are provided overleaf.

AMERON Coatings

AMERCOAT 307

Two Pack Epoxy Zinc Rich Primer
(Formerly AMERCOAT 302)

Data Sheet: 307
Supersedes: 07/99
Revised: 04/05

Composition	Epoxy resin containing zinc dust pigment.
Uses and Properties	AMERCOAT 307 is an economical organic zinc rich primer with excellent adhesion to prepared steel. The zinc content of the dry film offers cathodic protection to corrosion whilst the epoxy resin confers moisture and abrasion resistance and ability to be overcoated with heavy duty topcoats. AMERCOAT 307 primes steel in the field or is used in the yard as a pre-fab primer. AMERCOAT 307 may be topcoated with a wide variety of coatings, including epoxy, organic polysiloxanes, chlorinated rubber and polyurethane. May also be topcoated with alkyd coatings, providing an unsaponifiable barrier coat is used (e.g AMERETCH 783) is used.
Typical Applications	Steel Industry - Paper Industry - Shipping Industry - Oil Industry - Chemical Industry - Rolling Stock - Food and Beverage Industry - Marine and Industrial Environment - Mining Industry - Repair to Galvanizing – Sporting Stadiums – Entertainment Complexes- Shopping Centres.

Typical Systems

Substrate	Surface Preparation	Typical Systems	dft µm
Atmospheric Service	Class 2 ½ blast cleaning.	**A: Conventional 3 Coat System:**	
		1st Coat: AMERCOAT 307	60-75
		2nd Coat: AMERCOAT 385	75-100
		3rd Coat: AMERCOAT 450K	40-50
		B: 2 Coat Highly Durable Polysiloxane Finish	
		1st Coat: AMERCOAT 307	60-75
		2nd Coat: PSX 700 ❶	100-125

❶ For extra long life in a very severe environment AMERCOAT 307 can be replaced with AMERCOAT 68K and an intermediate coat of AMERCOAT 370 included.

AMERCOAT 307

General Data	
Weathering	Excellent when topcoated.
Finish	Matt.
Chemical Resistance	Not resistant to acids or alkalies because of zinc metal content. Use zinc phosphate primer such as AMERCOAT 370ZP in these environments.
Abrasion Resistance	Good.
Immersion	Suitable for use in salt and fresh water when properly topcoated.
Temperature Range	Up to 200ºC (dry heat).
Colour	Grey.
Topcoating	May be top coated with AMERCOAT 450SGK, AMERSHIELD, AMERCOAT 385, AMERCOAT 370, AMERLOCK 400, AMERLOCK 2K and PSX700. May be top coated with alkyd enamels provided an unsaponifiable barrier coat such as AMERETCH 783 is first applied. If AMERCOAT 307 is not overcoated for some time, it is important that surface deposits and white rust be removed by scrubbing with nylon brushes and fresh water, prior to recoating.
Shelf Life	12 months from date of shipment if stored indoors at 4°C to 38°C – Base and Hardener.
Application Data	
Theoretical Coverage	12 sq. metres per litre at 50 µm Dry Film Thickness. (Wet Film thickness 85 µm). Material losses during mixing and application will vary and must be considered when estimating requirements.
Volume Solids	60% ± 3% (theoretical).
Drying Time (@ 25ºC)	Surface dry 10-15 minutes. Recoat after 2 hours. Fully cured 7 days. Will not cure if ambient/surface temperature is below 10ºC.
Pot Life (@ 25ºC)	8 hours. *NOTE: The figures quoted for pot life and drying/curing times are not definitive. They are dependent on site conditions, such as volume of material mixed, ambient and steel temperatures, weather and ventilation.*
Mixing	Power stir Base, add Hardener and power stir until completely homogeneous. Allow to digest for 15 minutes before thinning and use.
Mixing Ratio	5 Parts Base to 1 part Hardener
Thinners	Thin up to 20% using THINNER 304. Use THINNER 304 for clean-up.
Equipment	Spray application - use pressure fed spray gun with Samson SP1 set up or equivalent with 400 kPa atomising pressure and pot pressure according to length of material line used. Airless spray application – use 0.5 - 0.7 mm (0.21" to 0.28") tipsize and atomising pressure of 14 - 21 Mpa. Brush or roller for small areas only.
Safety Precautions	When applying by brush or roller, provide adequate ventilation. When applying by spray, users must comply with relevant spray painting regulations and wear appropriate respirator to avoid inhaling vapours and spray mist. Material Safety Data Sheet is available and should be consulted.

Ameron Coatings 183 Prospect Hwy, Seven Hills NSW 2147
Telephone: (02) 9421 8000 Fax: (02) 9838 9573 Customer Service: 1300 659 666
A Division of Ameron (Australia) Pty Ltd ABN 91 081 516 565

AMERON Coatings

PSX 700

Engineered Siloxane Coating

Product Data

Data Sheet: 700
Supersedes: 07/00
Revised: 08/04

PSX Advantage: PSX 700 is a patented engineered siloxane coating which embodies the properties of both a high performance epoxy and a polyurethane in one coat. This multi-purpose coating offers "breakthrough" weather resistance and corrosion control.

- Unique, high-gloss, super durable coating
- Can be applied directly over inorganic silicate such as AMERON D9
- Cures at room temperature
- Gloss and appearance retention exceeding the best polyurethane
- Significantly lower applied costs
- Excellent to acids and corrosion.
- High solids, low VOC
- Resists high humidity and moisture
- Applied by brush, roller or spray – without thinning
- Outstanding resistance to chemical splash and spill

Typical Uses

PSX 700 offers significant advantages in that the system can normally be applied in two coats compared to the traditional systems using epoxies and urethanes. It provides very effective long-term corrosion control and weatherability.

- Structural steel - bridges, marine
- Tanks
- Piping
- Industrial plants – power, pulp and paper, wastewater treatment, chemical and petrochemical
- Concrete walls and floors
- Transportation – rail car exterior, vehicle equipment, buses, trucks
- Marine – decks, boottops, topside and superstructures on ships, barges and offshore platforms
- Indoor aquatic centres
- Commercial buildings and shopping centres
- Airports and hospitals
- Coastal developments

Physical Data

Finish	Gloss
Colour	Large range of colours from Ameron POS system
Components	2
Curing mechanism	Chemical reaction
Volume solids	90 ± 3%
Coats	1 or 2
Dry film thickness per coat	75-150 μm (80-160 μm Wet)
Theoretical Coverage	
at 125 microns	7.1 m^2/L
Temperature resistance, dry	°C
Continuous	93
Intermittent	121

Qualifications

NFPA – Class A

USDA – Incidental food contact

NORSOK M-CR-501 (coating system 1)

ISO 12944 (Class C5M)

Shell Specification ES/011 Vol. 2 Rev. 7

ACQPA France

"O" Class fire rating (UK Building Regulations) based on testing according to BS476 Parts 6 and 7 (fire propagation and flame spread).

Application Data

Applied over	Correctly prepared primed steel, galvanising or aluminium.		
Surface preparation			
Steel / concrete	Refer application instructions for the specific primer used. Be sure primer is clean and dry when PSX700 is applied.		
Method	Airless or conventional spray, brush or roller		
Mixing ratio (by volume)	4 parts A to 1 part B		
Pot Life (Hours) *			
700 / mixed paint	32°C	21°C	10°C
	1 ½	4	6 ½

** Thinning material with 6% thinner after 3 hours will extend pot life to 5 hours at 21°C.*

Typical Properties PSX 700

Physical

Abrasion (ASTM D4060)	
1kg load/1000 cycles	weight loss
CS-17 wheel	53 mg
Adhesion, elcometer	
(ASTM D4541)	2700 psi
Elongation (ASTM D522)	14%

Performance

Salt spray (ASTM B117)	5500 hours
Face corrosion, blistering	None
Humidity (ASTM D2247)	5500 hours
Face corrosion, blistering	None
Gloss retention (ASTM G53) QUV-B bulb	
Greater than 50% gloss retention at 26 weeks	

PSX 700 Chemical Resistance Guide

Environment	Splash Spillage	Fumes & Weather
Acidic	E	E
Alkaline	E	E
Salt solutions		
Acidic	E	E
Neutral	E	E
Alkaline	E	E
Fresh water	E	E
Solvents	E	E
Petroleum products	E	E

F= Fair G=Good E=Excellent

This table is only a guide to show typical resistances of PSX 700. For specific recommendations, contact your Ameron representative for your particular corrosion protection needs.

Systems Using PSX 700

Steel (blasted Sa 2 ½ +)	DFT	PSX 700 DFT
Ameron D9 *	65-75	75-125
Amercoat 68K	70-85	75-125
Amercoat 471		70-85 75-125
Concrete **		
Amercoat 385	100-125	75-125
Amerlock 2	100-125	75-125
Aluminium – sweep blast		
Galvanised – sweep blast		
Amercoat 385	100-125	75-125

* as per Technical Data Sheet

** as per Application Instructions

Surface Preparation

Steel should be cleaned, free of oil and grease prior to abrasive blasting to Class 2 ½ or better AS/NZS 1627.4. Round off all rough welds and remove all weld spatter. Apply recommended primer as per instructions.

Environmental Conditions

Temperature	
Air	4 to 35°C
Surface	4 to 35°C
Relative humidity	40% minimum

Surface temperatures must be at least 3°C above dew point to prevent condensation during application and initial dry through. Relative humidity lower than 40% will extend dry times.

Heat Curing

Allow PSX700 to dry to touch before exposing to curing temperatures above 60°C.

Drying Time (ASTM D1640) (Hours) @ 40% R.H. or above

	32°C	21°C	10°C	0°C
Touch (700)	1	2	4 ½	9
Through (700)	3	4 ½	8 ½	24

Recoat / Topcoat Time (hours) @ 40% R.H. or above

	32°C	21°C	10°C	0°C
PSX700 over PSX700	2	3	7	18
maximum	None			
Thinner	Thinner 140			
Equipment cleaner	Thinner 304			

Shelf life when stored indoors at 4 to 38°C

Part A & B 2 years from shipment date

Numerical values are subject to normal manufacturing tolerances, colours and testing variances. Allow for application losses and surface irregularities.

Safety Precautions

Improper use and handling of this product can be hazardous to health.

Read each component's material safety data sheet before use. Mixed material has hazards of each component.

This product is only for industrial use by experienced applicators.

Keep away from children. When mixing or applying wear goggles and gloves and ensure good ventilation. When spraying, wear appropriate protective clothing and air supply. If splashed on skin, wash with soap and water. Adequate forced ventilation must be provided in confined spaces.

AMERON Coatings

Ameron Coatings 183 Prospect Hwy, Seven Hills NSW 2147

Telephone: (02) 9421 8000 Fax: (02) 9838 9573 Customer Service: 1300 659 666

A Division of Ameron (Australia) Pty Ltd ABN 91 081 516 565

PAINT FINISH FOR ALUMINIUM COMPONENTS

Ameron Multi-etch 302/Amercoat 385/Iso-free 977

Surface preparation: Degrease, abrade, clean		
1st coat:	Ameron Multi Etch 302 two-pack etch-primer	6–12 µm dry-film thickness
2nd coat:	Ameron Amercoat 385 multi-purpose two-pack epoxy	40–50 µm dry-film thickness
3rd coat:	Ameron Iso-free 977	40–50 µm dry-film thickness

Data sheets are provided overleaf.

AMERON Coatings

MULTI ETCH 302

Two Pack Etch Primer

Data Sheet: 302
Superseded 12/98
Revised 06/99

Composition	MULTI ETCH 302 is a two pack, Polyvinyl Butryal based, phosphoric acid catalysed etch primer pigmented with anticorrosive zinc tetroxy chromate.
Specification Compliance	APAS GPC-P-35/2.
Uses and Properties	For all metal surfaces, iron, steel, galvanized iron, aluminium, magnesium, light alloys, zinc, tin, cadmium, copper, etc. To provide a thin, hard, flat anti-corrosive film primer which will serve as an excellent bond for subsequent coatings, such as primers, undercoats or finishing coats. The film has excellent adhesion to most metal surfaces. Over iron and steel, an iron oxide and zinc phosphate film is formed, similar to that deposited in the standard phosphating process.
Typical Applications	As an etch primer for iron, steel, stainless steel, galvanised steel, zinc coated steel such as zincanneal, zinc matte etc., zinc metal spray, aluminium, zinc diecastings, copper, brass, tin and other alloys. Can be used in a wide variety of industrial and marine applications such as stanchions, gates, ladders, ship's superstructures, small aluminium craft, metal fabrication, chemical plants and appliances.

Typical Systems

Substrate	Surface Preparation	Typical Systems	dft µm
Galvanised and zinc coated steel, aluminium and most non ferrous metals	Degrease, abrade and clean	1st Coat: MULTIETCH 302 2nd Coat: AMERCOAT 385 ❸ 3rd Coat: AMERCOAT 450K ❹ alternatively 1st Coat: MULTI ETCH 302 2nd Coat: AMERCOAT 185K ❶ 3rd Coat: AMERON QD600 ❷	6-12 40-50 40-50 6-12 40-50 40-50

❶ Other primers such as, RUSTFIGHTER 215ZP, may be suitable.
❷ Other top coats such as STYRALUX 220 ENAMEL may be suitable.
❸ Other two pack epoxy coatings such as AMERCOAT 370K, AMERCOAT CC24 and AMERCOAT CC89 may be used.
❹ Other two pack top coats such as LUSTERTHANE 988, AMERON ISO-FREE 977, AMERCOAT 72K may be used.

MULTI ETCH 302

General Data	
Weathering	Requires top coating.
Finish	Eggshell-gloss, translucent.
Chemical Resistance	Must be overcoated.
Solvent Resistance	Not recommended.
Abrasion Resistance	Fair.
Immersed Conditions	Not recommended.
Temperature Range	Up to 65ºC dry heat, 125 °C for short periods.
Colour	Yellowish-brown.
Topcoating	Depending on service requirements. May be overcoated with a variety of single pack and two pack systems.
Shelf Life	12 months if stored in sealed containers away from heat or moisture.
Application Data	
Theoretical Coverage	Approximately 6.3 sq.m. per litre to give a dry film thickness of approximately 12 μm .
	Material losses during mixing and application will vary and must be considered when estimating requirements.
Volume Solids	7.6% (theoretical).
Drying Time (@ 25ºC)	Touch dry: 5-10 mins. Hard dry: 30 mins. Recoat: 30 mins minimum, 12 hours maximum. (Longer at lower temperatures).
Mixing Ratio	1 Part Base to 1 Part Hardener.
Pot Life	Approximately 6-8 hours.
	NOTE: The figures quoted for pot life and drying/curing times are not definitive. They are dependent on site conditions, such as volume of material mixed, ambient and steel temperatures, weather and ventilation.
Thinners	THINNER 265.
Method	Stir the base well and slowly mix in the Hardener. Wait 10 minutes for complete reaction. Brushing, Spraying or dipping will result in a thin film which looks more like a "wash" than a proper coat. Thin if necessary to achieve this "thin" coat.
	Care should be taken to protect the primed surface from moisture and rain before it is topcoated. Do not apply when surface temperature is less than 2ºC below the dew point or relative humidity is above 85%.
Application	Conventional Spray: Thin up to 30%. Apply at an air atomising pressure 350-400 kPa. Brush or roller etc.
Safety Precautions	When applying by brush or roller, provide adequate ventilation. When applying by spray, users must comply with relevant spray painting regulations and wear appropriate respirator to avoid inhaling vapours and spray mist. Material Safety Data Sheet is available and should be consulted.

As Ameron Coatings follow the policy of continuous improvement, this leaflet is issued for general guidance only. It is based on tests and information believed to be accurate at the time of printing. All recommendations and suggestions issued by or on the behalf of the Company are however subject to the Company's conditions of sale.

AMERON Coatings

Ameron Coatings 183 Prospect Hwy, Seven Hills NSW 2147
Telephone: (02) 9421 8000 Fax: (02) 9838 9573 Customer Service: 1300 659 666
A Division of Ameron (Australia) Pty Ltd ABN 91 081 516 565

AMERON Coatings

AMERCOAT 385

Multi Purpose Two Pack Epoxy

Data Sheet: 385
Supersedes 07/99
Revised 06/03

Composition

Two-pack high performance epoxy coating

Uses and Properties

- Multi purpose high build epoxy coating.
- Suitable for overcoating with a wide range of topcoats.
- Suitable for immersion service.
- Excellent adhesion to inorganic zinc silicates.
- Can be applied in a wide range of film builds.
- Compatible with a variety of substrates and surface preparations.
- Easy application

Typical Applications

Decks, hulls and superstructures of ships, barges and work boats – Piers, offshore platforms and related structures – Tank exteriors in oil refineries, paper mills, chemical processing facilities and waste water treatment plants -–industrial structural steel, machinery and piping.

Typical Systems

Substrate	Surface Preparation	Typical Application	dft µm
Structural Steel	Abrasive blast clean to AS1627.4 Class 2½ min.	1st Coat: AMERON D9 ❶ 2nd Coat: AMERCOAT 385 3rd Coat: AMERCOAT 450K ❷	60-75 100-150 40-50
Mild steel	Abrasive blast clean to AS1627.4 Class 2.	1st Coat: AMERCOAT 385P 2nd Coat: AMERCOAT 450K ❷	40-50 40-50
Galvanised steel	Degrease, whip blast or acid etch.	1st Coat: AMERCOAT 385 2nd Coat: AMERCOAT 450K ❷	100-150 40-50
Aluminium	Degrease, whip blast or acid etch	1st Coat: AMERCOAT 385 2nd Coat: AMERCOAT 450K ❷	100-150 40-50
Concrete	Whip blast or acid etch.	1st Coat: AMERCOAT 385 2nd Coat: AMERCOAT 450K ❷	100-150 40-50

❶ Other primers such as AMERCOAT 68K, AMERON D9FT, AMERCOAT 182ZP, AMERCOAT 370KP may be used depending on exposure conditions.

❷ Other topcoats such as LUSTERTHANE 988, AMERON ISO-FREE 977, AMERCOAT 72K, may be used depending on exposure conditions.

AMERCOAT 385

General Data	
Weathering Finish	Excellent for a primer. Must be topcoated before deterioration.
Chemical Resistance	Suitable for mild acidic and alkaline splashing. Not intended for prolonged exposure
Solvent Resistance	Resists splashing of oils, alcohols, hydrocarbons.
Abrasion Resistance	Excellent. (For transport and erection.)
Immersed Conditions	Suitable for immersion.
Temperature Range	Up to 93 ºC (dry), 60 ºC (wet) - splash.
Colour	White
Top Coating	AMERCOAT 450K, LUSTERTHANE 988, AMERON ISO-FREE 977, AMERCOAT 72K and most other two pack coatings.
Application Data	
Covering Capacity (Theoretical)	5.2 square metres per litre at 125 µm dry film thickness. (Wet film thickness 190 µm). Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.
Volume Solids	66% ± 2%.
Drying Time (at 25ºC)	Touch dry in 2 hours. Hard dry in 16 hours (approx.). Fully cured in 7 days. Will not cure at temperatures below 0 ºC. Drying may be retarded at excessive film builds.
Recoating Time (at 25ºC)	Recoat time 7 hours.
Mixing Ratio	1 part Base to 1 part Hardener
Pot Life at 25 ºC	2 hours, shorter at higher temperatures.
Note:	*The figures quoted for pot life and drying/curing times after mixing the components are not definitive. They are dependent on job site conditions such as volume of mixed material, ambient and steel temperature variations, weather and ventilation, and influenced by the previous storage conditions.*
Thinner	THINNER 737 / AMERCOAT 65. Use 304 THINNER for clean up.
Method	Stir Base and Hardener thoroughly, then combine Base and Hardener and power stir to a uniform consistency. Application by conventional or airless spray, thinning up to 10% with THINNER 737 / AMERCOAT 65. Apply by repeated wet on wet applications to required thickness. Clean equipment immediately after use.
Safety Precautions	Recommended only for application by experienced industrial operators in industrial coating operations. Avoid contact with skin. Protective gloves are recommended. When applying by brush or roller, provide adequate ventilation. When applying by spray, users must comply with relevant spray painting regulations and wear appropriate respirator to avoid inhaling vapours and spray mist. Material Safety Data Sheet is available and should be consulted.

AMERON Coatings
Ameron Coatings 183 Prospect Hwy, Seven Hills NSW 2147
Telephone: (02) 9421 8000 Fax: (02) 9838 9573 Customer Service: 1300 659 666
A Division of Ameron (Australia) Pty Ltd ABN 91 081 516 565

AMERON Coatings

AMERON ISO-FREE 977

Catalysed Two Pack Isocyanate Free

Data Sheet: 977
Supersedes 04/00
Revised 12/00

Composition	Two component, non-yellowing, catalysed acrylic enamel.
APAS Approval	GPC-C-29/19A
Uses and Properties	For the long term protection of steel, concrete or other surfaces exposed to chemical environment and weathering, AMERON ISO-FREE 977 possesses the combined advantages of both polyurethane acrylic giving excellent chemical, solvent and water resistant properties, combined with excellent weathering and gloss retention. This makes AMERON ISO-FREE 977 an outstanding coating for a wide range of applications.
Typical Applications	Marine Industry - Textile Industry - Food Industry - Offshore Drilling - Rail and Road Tankers - Construction Industry Harbourside Facilities - Oil Refineries - Chemical Industry - Tank Exteriors

Typical Systems

Substrate	Surface Preparation	Typical Application	dft µm
Structural Steel	Surface must be clean, dry, free from oil and grease. Abrasive blast to AS1627 Part 4 Class 2½. Refer Surface Preparation Guide	1st Coat: AMERON D9 ❶ 2nd Coat: AMERCOAT 385 ❽ 3rd Coat: AMERON ISO-FREE 977 4th Coat: AMERON ISO-FREE 977 Total Dry Film Thickness	65-75 100-125 50-75 50-75 260 min
Concrete, cement render	Fins should be ground off, edges rounded adequately by grinding, then surface roughened, and voids exposed for filling, by abrasive blast cleaning "whip blasting" - see Surface Preparation Guide ❹	1st Coat: AMERCOAT 385 thinned 15- 33% with THINNER 304 2nd Coat: AMERCOAT 385 ❻ 3rd Coat: AMERON ISO-FREE 977	40-50 100-125 50-75
Sheet Steel	Abrasive blast clean to AS1627.4 Class 2 or hand or power tool clean or chemically etch.	1st Coat: AMERCOAT 385P ❷ 2nd Coat: AMERON ISO-FREE 977	40-50 40-50
Galvanized Surfaces	Structural sizes - whip blast to achieve uniform anchor pattern.	1st Coat: AMERCOAT 385 ❺ 2nd Coat: AMERON ISO-FREE 977 3rd Coat: AMERON ISO-FREE 977	75-100 50-75 50-75
	Sheet galvanizing or Zincalume - degrease, abrade and clean with solvent or etch with METAPHOS 67.	1st Coat: AMERCOAT 385 ❺ 2nd Coat: AMERON ISO-FREE 977	40-50 40-50

❶ Other metallic zinc primers may be used such as AMERCOAT 68K, AMERCOAT 471. Refer Ameron Coatings Technical Service.
❷ If required, AMERCOAT 182ZP, AMERCOAT 474 Primers may be used with this product, depending on conditions.
❽ AMERLOCK 2 MIO and AMERCOAT 472 MIO pigmented coatings may be used as the second coat, depending on circumstances.
❹ Acid etching is an acceptable alternative in some cases
❺ AMERCOAT CC24 EPOXY MASTIC may also be used.
❻ AMERLOCK 400, AMERLOCK 2, VEPOX HS 661 can also be used on correctly prepared concrete.

AMERON ISO-FREE 977

General Data	
Weathering	Excellent.
Finish	High gloss.
Chemical Resistance	Very good.
Solvent Resistance	Excellent.
Abrasion Resistance	Excellent.
Immersed Conditions	Not recommended.
Temperature Range	Up to 120° dry heat.
Colours	Most colours available from Amercolour Tinting System.
Topcoatings	Not required.
Application Data	
Theoretical Coverage	AMERON ISO-FREE 977 covers approximately 9.6 square metres per litre to give a dry film thickness of 50 µm. (Wet film thickness 105 µm). Material losses during mixing and application will vary and must be considered when estimating job requirements.
Volume Solids (theoretical)	48% ± 2% (white - varies with colour).
Drying Times (25°C, 50% R.H.)	Touch dry in 1 hour. Full cure may take 5 days minimum. Curing will be unduly long below 4°C.
Recoating Time (@ 25°C)	Recoat 16 hours minimum. Aged films must be free of chalk and dirt before recoating.
Mix Ratio	3 parts base to 1 part hardener.
Pot Life (@ 25°C)	6 hours.
Thinning	THINNER 300. (THINNER 539 retarder thinner is available for hot, windy conditions.
Method	Mix AMERON ISO-FREE 977 by power stirring Base then mix in Hardener. Allow to stand 15 minutes. Suitable for application by conventional or airless spray. For conventional spray, use pressure pot unit with DeVilbiss JGA 502 gun, FF fluid tip and needle, 704 air cap or equivalent with 10mm fluid line 60-105 kPa (10-15 psi) pot pressure and 370-450 kPa (55-65 psi) atomising pressure. Thin 20 - 25% by volume with THINNER 300. For airless spray use 20.6 mPa (3,000 psi) input pressure and 330 mm (13 thou) tip. Thin 10% by volume with THINNER 300. Thinning may have to be increased according to ambient conditions. **A full, wet continuous coat must be applied, to ensure adequate film integrity, adhesion and durability.**
Handling	AMERON ISO-FREE 977 contains flammable solvents. Keep away from heat and open flame. AMERON ISO-FREE 977 should not be allowed to remain on the skin and normal hygiene standards should be observed when using this product, i.e. wear gloves, goggles and mask and rolled own sleeves when spraying. Spray painting must be performed in a properly exhausted and approved spray booth. Otherwise use a combination dust/organic vapour respirator to AS1716. Avoid breathing dust when sanding.

As Ameron Coatings follow the policy of continuous improvement, this leaflet is issued for general guidance only. It is based on tests and information believed to be accurate at the time of printing. All recommendations and suggestions issued by or on the behalf of the Company are however subject to the Company's conditions of sale.

AMERON Coatings

Ameron Coatings 183 Prospect Hwy, Seven Hills NSW 2147
Telephone: (02) 9421 8000 Fax: (02) 9838 9573 Customer Service: 1300 659 666
A Division of Ameron (Australia) Pty Ltd ABN 91 081 516 565

Appendix B. Strammit metal cladding

Strammit Longspan
Strammit Minirib

Stramit

STRAMIT LONGSPAN®

ROOF AND WALL CLADDING

product technical manual

LONG

Stramit

STRAMIT LONGSPAN®
ROOF AND WALL CLADDING

Selection & Specification

Features

- 700mm Cover – quick installation and easy handling.
- Easy Fixing – conventional through fixed screws maximise performance and installation.
- Hi-Tensile Steel – light weight and high strength with improved damage resistance.
- Spring Curving – new data for curved roofs.
- Design Flexibility – long lengths and anti-capillary side laps enable ***Stramit Longspan***® cladding to be used effectively on applications from vertical wall cladding and fascias to roofs with pitch as low as 1.5°.
- Fully Tested – a full range of load performance tables to suit most applications.
- Extended Spans – strength and rigidity of the profile allows economical construction.

Applications

The striking linearity, strength, wide cover, light weight and weather resistance of ***Stramit Longspan***® cladding make it perfect for many commercial roofing and walling applications. Its excellent strength and ease of assembly allow for long, economical spans. The good water-carrying capacity and weather-tightness permit very low roof pitches, leading to economies in the building structure.

Stramit Longspan® cladding is also used for domestic applications, where a strong but uniform appearance is desired.

Materials

Stramit Longspan® cladding is manufactured from hi-tensile G550 colour coated steel or zinc-aluminium alloy coated steel. In some locations galvanised and severe environment colour coated steel may be available by arrangement. Colour coated steels are in accordance with AS2728 – Category 3 and, for the substrate, with AS1397. Zinc-aluminium alloy coated AZ150 and galvanised Z450 conform to AS1397.

Stramit has a comprehensive range of colours as standard. Ask your nearest Stramit location for colour availability.

STRAMIT LONGSPAN® CLADDING – SHEETING MASS (kg/m² of roof area)

	ZINCALUME®	COLORBOND®	GALVANISED
0.42mm BMT	4.66	4.74	5.07
0.48mm BMT	5.29	5.37	5.70

Adverse Conditions

Stramit Longspan® cladding will give excellent durability in almost all locations. It is however important to choose the correct coating for each application environment. The table below shows the suitability of coating types for different exposure conditions.

suitability of coating type	site exposure condition			
	benign	moderate	severe	very severe
ZINCALUME® AZ150	✓	?	?	✗
GALVANISED Z450	✓	?	✗	✗
COLORBOND®	✓	✓	?	✗
COLORBOND® Ultra	N/A	N/A	✓	?

? Question marks indicate conditions where durability may be diminished, depending on the particular application.

The approximate site exposure conditions in the table above are defined below.

	distance of site from			
site exposure condition	rough active surf	calm, still salt water	industrial emission	fossil fuel combustion
benign	1000m +	100m +	500m +	500m +
moderate	400m-1000m	0-100m	250m-500m	250m-500m
severe	100m-400m	N/A	100m-250m	100m-250m
very severe	0-100m	N/A	0-100m	0-100m

The suitability and exposure tables above are guidelines only; conditions will vary from site to site. If in any doubt about the choice of coating for a particular application contact your nearest Stramit office for advice.

Compatibility

All building products need to be checked for compatibility with adjacent materials. These checks need to be for both direct contact between materials, and where water runs from one material to another. The following guidelines generally avoid material incompatibility:

- For zinc-aluminium alloy coated steel, colour coated steel and galvanised steel roofs avoid copper, lead, green or treated timber, stainless steel and mortar or concrete.
- In addition galvanised steel roofs should not receive drainage from aluminium or any inert materials, such as plastics, glass, glazed tiles, colour coated and zinc-aluminium alloy. Contact Stramit for more detailed information.

Testing

Stramit has in-house, purpose built, testing equipment used to design, develop and improve products for the Australian market. In addition many Stramit products are tested or witnessed by independent organisations. These include:

- Cyclone Structural Testing Station (James Cook University)
- The University of Sydney
- Monash University
- CSIRO
- University of Queensland
- University of Technology, Sydney

This ongoing research and development activity ensures that Stramit remains at the forefront of innovation, design and consumer information.

Architectural Specification

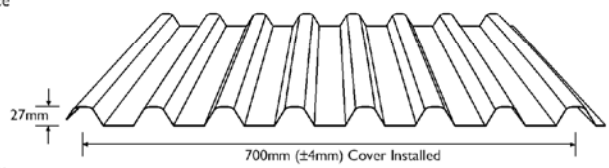
This specification can be found on the Stramit web site and can be easily downloaded onto your documentation.

The roofing/walling shall be 0.42 (or 0.48) mm BMT ***Stramit Longspan***® cladding in continuous lengths with trapezoidal ribs 27mm high, spaced at 100mm centres. Sheeting material shall be protected steel sheet to Australian Standard AS1397, with a minimum yield stress of 550MPa (Grade G550) and an AZ150 zinc-aluminium coating with or without an oven-baked paint film of selected colour. The sheeting shall be fixed to the purlins/girts in accordance with the manufacturer's recommendations. Suitable fixing screws in accordance with Australian Standard AS3566, Class 3, shall be used at every support with side lap fasteners installed at mid span if required. Sheets shall be laid in such a manner that the approved side lap faces away from the prevailing weather. A minimum of 50mm shall be provided for projection into gutters. Flashings shall be supplied in compatible materials as specified; minimum cover of flashing shall be 150mm. All sheeting shall be fixed in a workman-like manner, leaving the job clean and weathertight. Repair minor blemishes with touch-up paint supplied by the sheeting manufacturer. All debris (nuts, screws, cuttings, filings etc.) shall be cleaned off daily.

Design

Spans

The spans shown below take account of 'normal' foot traffic and wind resistance including local pressure zone effects. Pressures are based on AS4055 or AS1170.2 section 2. Where the two standards differ, the worst case has been taken for each classification. Data should only be used for buildings 7m or less in height, 1000m² or less in area and unaffected by land topography.



STRAMIT LONGSPAN® CLADDING – MAXIMUM SPAN CHART (mm)

bmt (mm)	fasteners per sheet at each support	roofs: pressure (kPa) service -ability	roofs: pressure (kPa) strength	roofs: double spans	roofs: equal spans	roofs: internal (end) span combination	walls: pressure (kPa) service -ability	walls: pressure (kPa) strength	walls: double spans	walls: equal spans	walls: internal (end) span combination	overhangs: free edge	overhangs: stiffened edge
N1 or Region A (sheltered suburban)													
0.42	3 screws	0.76	1.35	1750	1750	2100 (1750)	0.61	1.04	2700	2700	3000 (3000)	200	500
	4 screws	0.76	1.35	1750	1750	2100 (1750)	0.61	1.04	3000	3000	3000 (2500)	200	500
0.48	3 screws	0.76	1.35	2250	2250	2700 (2250)	0.61	1.04	3000	3000	3000 (2500)	250	500
	4 screws	0.76	1.35	2250	2250	2700 (2250)	0.61	1.04	3000	3000	3000 (2500)	250	500
N2 or Region B (sheltered suburban) and Region A (exposed suburban)													
0.42	3 screws	0.78	1.94	1750	1750	2100 (1750)	0.61	1.49	2700	2700	3000 (2500)	150	450
	4 screws	0.78	1.94	1750	1750	2100 (1750)	0.61	1.49	3000	3000	3000 (2500)	200	500
0.48	3 screws	0.78	1.94	2250	2250	2700 (2250)	0.61	1.49	3000	3000	3000 (2500)	200	500
	4 screws	0.78	1.94	2250	2250	2700 (2250)	0.61	1.49	3000	3000	3000 (2500)	250	500
N3 or Region A (rural) and Region B (exposed suburban)													
0.42	3 screws	1.18	2.96	1600	1600	1900 (1550)	0.92	2.25	2050	2050	2350 (1950)	100	400
	4 screws	1.18	2.96	1750	1750	2100 (1750)	0.92	2.25	2500	2500	2650 (2200)	150	450
	5 screws	1.18	2.96	1750	1750	2100 (1750)	0.92	2.25	2550	2500	3000 (2500)	150	450
0.48	3 screws	1.18	2.96	2050	2050	2350 (1950)	0.92	2.25	2500	2500	2800 (2300)	150	450
	4 screws	1.18	2.96	2250	2250	2650 (2200)	0.92	2.25	2900	2900	3000 (2500)	200	500
	5 screws	1.18	2.96	2250	2250	2700 (2250)	0.92	2.25	2850	2900	3000 (2500)	250	500

Internal spans must have both end spans 20% shorter. Values are only valid for use with steel members of 0.75mm or thicker.
For more specific applications ***Stramit Longspan®*** cladding must be designed to the pressure and foot traffic limitations below.

Pressures

STRAMIT LONGSPAN® CLADDING – SERVICEABILITY LIMIT STATE CAPACITY

thickness bmt(mm)	fasteners per sheet	span type	(kPa) at the spans (mm) shown: 600	900	1200	1500	1800	2100	2400	2700	3000
0.42	3	internal	1.66	1.66	1.53	1.39	1.25	1.10	0.95	0.82	0.70
		equal	1.58	1.58	1.42	1.25	1.07	0.90	0.75	0.62	0.54
		double	1.58	1.58	1.42	1.25	1.07	0.90	0.75	0.62	0.54
	4	internal	5.58	5.58	4.52	3.60	2.82	2.16	1.63	1.22	0.93
		equal	4.93	4.93	3.78	2.82	2.05	1.45	1.03	0.77	0.66
		double	4.93	4.93	3.78	2.82	2.05	1.45	1.03	0.77	0.66
	5	internal	5.58	5.58	4.52	3.60	2.82	2.16	1.63	1.22	0.93
		equal	4.93	4.93	3.78	2.82	2.05	1.45	1.03	0.77	0.66
		double	4.33	4.33	3.60	2.87	2.19	1.59	1.11	0.78	0.65
0.48	3	internal	2.66	2.66	2.24	1.92	1.69	1.52	1.39	1.26	1.12
		equal	2.39	2.39	1.98	1.69	1.49	1.34	1.18	0.99	0.71
		double	2.39	2.39	1.98	1.69	1.49	1.34	1.18	0.99	0.71
	4	internal	8.67	8.67	6.31	4.57	3.35	2.54	2.03	1.70	1.46
		equal	7.17	7.17	4.88	3.35	2.42	1.88	1.55	1.25	0.77
		double	7.17	7.17	4.88	3.35	2.42	1.88	1.55	1.25	0.77
	5	internal	8.67	8.67	6.31	4.57	3.35	2.54	2.03	1.70	1.46
		equal	7.17	7.17	4.88	3.35	2.42	1.88	1.55	1.25	0.77
		double	4.97	4.97	3.94	3.09	2.39	1.84	1.40	1.05	0.79

STRAMIT LONGSPAN® CLADDING – STRENGTH LIMIT STATE CAPACITY (Non-cyclonic)

thickness bmt(mm)	fasteners per sheet	span type	(kPa) at the spans (mm) shown								
			600	900	1200	1500	1800	2100	2400	2700	3000
0.42	3	internal	7.35	7.35	5.82	4.56	3.56	2.78	2.21	1.80	1.54
		equal	6.98	6.98	5.24	3.89	2.90	2.22	1.79	1.56	1.48
		double	6.98	6.98	5.24	3.89	2.90	2.22	1.79	1.56	1.48
	4	internal	8.57	8.57	6.80	5.35	4.19	3.30	2.64	2.20	1.94
		equal	8.63	8.63	6.49	4.85	3.65	2.83	2.35	2.15	2.17
		double	8.63	8.63	6.49	4.85	3.65	2.83	2.35	2.15	2.17
	5	internal	9.39	9.39	8.35	7.36	6.44	5.60	4.86	4.23	3.74
		equal	9.41	9.41	8.11	6.92	5.85	4.93	4.21	3.71	3.46
		double	9.41	9.41	8.11	6.92	5.85	4.93	4.21	3.71	3.46
0.48	3	internal	8.09	8.09	6.62	5.39	4.37	3.55	2.90	2.41	2.06
		equal	7.83	7.83	6.13	4.77	3.72	2.94	2.39	2.03	1.83
		double	7.83	7.83	6.13	4.77	3.72	2.94	2.39	2.03	1.83
	4	internal	9.63	9.63	7.50	5.88	4.69	3.85	3.28	2.91	2.67
		equal	9.58	9.58	7.14	5.43	4.30	3.61	3.20	2.92	2.63
		double	9.58	9.58	7.14	5.43	4.30	3.61	3.20	2.92	2.63
	5	internal	11.18	11.18	9.35	7.91	6.80	5.96	5.33	4.86	4.49
		equal	10.77	10.77	8.76	7.29	6.24	5.50	4.97	4.53	4.08
		double	10.77	10.77	8.76	7.29	6.24	5.55	4.97	4.53	4.08

Tables are based on testing to AS1562 and AS4040 parts 0, 2 and 3. Internal spans must have both end spans 20% shorter.
Values only valid for use with steel support members of 0.75mm or thicker.

Foot Traffic

Foot traffic limits for ***Stramit Longspan***® cladding are shown for three alternate foot traffic categories.

These are:

- High Maintenance – for applications with repeated maintenance, particularly where personnel may be unfamiliar with correct procedures for walking on metal roofs.
- Normal – based on traditional expectations, with moderate maintenance foot traffic using designated foot paths.
- Controlled – spans that conform to AS1562 but require minimal careful foot traffic only on the designated foot path. Suggested for use only where occasional aesthetic imperfections from foot traffic are acceptable.

STRAMIT LONGSPAN® CLADDING – FOOT TRAFFIC LIMITED SPANS (mm)

thickness bmt	span type	foot traffic limits		
		heavy	normal	controlled
0.42	internal	-	2100	2400
	equal	-	1750	1800
	double	-	1750	1800
0.48	internal	800	2700	3000
	equal	600	2250	2250
	double	600	2250	2250

Tables are based on tests to AS1562 and AS4040 parts 0 and 1.

For more information on foot traffic performance of ***Stramit Longspan***® cladding and other Stramit® roofing profiles refer to Stramit's Foot Traffic Guide.

Spring Curving

Stramit Longspan® cladding can be spring-curved, concave and convex, including curved ridges, provided it is sealed at the apex, and within the recommended limits below:

STRAMIT LONGSPAN® CLADDING– SPRING-CURVED RADII LIMITS (m)

bmt (mm)	performance restricted		restricted by drainage at the rainfall intensities shown		
	minimum* radius	lowest neutral radius	370 mm/hr	220 mm/hr	150 mm/hr
0.42	30*	88	78	131	192
0.48	20*	113	78	131	192

*At these radii a maximum support spacing of 1200mm applies, and limit state pressure capacities are reduced by 14% for serviceability and 7% for strength. These reductions apply proportionately, up to the lowest neutral radius.

For more comprehensive information on spring curving ***Stramit Longspan***® cladding and other Stramit® roofing profiles refer to the Stramit Spring Curving Guide.

Thermal Expansion

All metal roof sheeting is subject to thermal expansion and, where there is a temperature difference between the sheeting and the structure, this needs to be accommodated. The colour of the sheeting will affect the amount of thermal expansion, and whether the sheet is flat or curved will affect its ability to resist without problems.

Sheet lengths should be limited to those shown below.

STRAMIT LONGSPAN® CLADDING – MAXIMUM SHEET LENGTH (m)

roof colour	light	dark
Flat	25	17
Spring-curved	20	17

Water Carrying

Stramit Longspan® cladding has a superior water-carrying capacity, to most close pitched trapezoidal profiles. This and the decking stiffness enable roof slopes to be as low as 1.5° for many applications. Roof run lengths are the combined lengths of all roof elements contributing to a single pan drainage path. This can include the roof length upstream of a roof penetration that concentrates flow into other pans. The table below gives slopes for 100 year return period rainfall intensity.

STRAMIT LONGSPAN® CLADDING – MINIMUM ROOF SLOPE (degrees)

rainfall intensity mm/hr	total roof run length (m)										
	20	25	30	40	50	60	70	80	90	100	110
150					1.5	2.2	3.3	4.6	5.4	7.5	9.5
175	*Minimum*			1.5	2.0	3.2	4.7	6.4	8.3	11	14
200	*Slope 1.5°*			1.5	2.8	4.6	6.5	9.0	12	15	18
225			1.5	2.2	3.8	6.0	8.5	12	15	19	22
250			1.5	2.8	5.0	7.5	11	15	19	23	
275		1.5	1.7	3.6	6.0	9.3	14	18	22		
300		1.5	2.0	4.6	7.5	12	16	21			
325		1.5	2.7	5.3	9.0	14	19	25	*Exceeds the scope of this manual*		
350	1.5	1.9	3.2	6.2	11	16	22				
375	1.5	2.4	3.8	7.5	13	18	25				
400	1.6	2.7	4.3	8.0	15	20					

For more information on water carrying performance of ***Stramit Longspan***® cladding and other Stramit® roofing profiles refer to Stramit's Roof Slope Guide.

Cyclonic Areas

Cyclonic Data for ***Stramit Longspan***® cladding can be found in the Stramit Cyclonic Areas Guide.

Information on the use of ***Stramit Longspan***® cladding in the Darwin area can also be found in deemed-to-comply sheets No M/109/11 and M/109/12. These are available from Stramit.

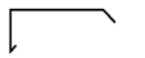
Procurement

Prices

Prices on ***Stramit Longspan***® cladding and its accessories can be obtained from your nearest Stramit location or distributor of Stramit products. As Stramit does not provide an installation service, ask your tradesperson for a supply and fix price. Contact your nearest Stramit location for the names of tradespersons in your area.

Related Products

Ridge Capping – standard or custom dimensions



Flashings – a range of custom flashings

Filler Strips – top and bottom; for eaves, ridge and joint sealing

Use only where sealing is preferred to ventilation

Insulation & roofing mesh – a range of mesh, sisalation, plain & foil backed blanket

Translucent sheeting – fibreglass sheeting in a range of shades and densities

Length

Stramit Longspan® cladding is supplied cut-to-length. When designing or transporting long products ensure that the length is within the limit of the local Transport Authority regulations. The manufacturing tolerance on the length of product supplied is +0, -15mm.

Ordering

Stramit Longspan® cladding can be ordered directly, through distributors, or supplied and fixed from a roofing contractor.

Delivery/Unloading

Delivery can normally be made within 48 hours, subject to the delivery location, quantity and material availability, or can be at a pre-arranged date and time. Please ensure that suitable arrangements have been made for truck unloading, as this is the responsibility of the receiver. Pack mass may be up to one tonne. When lifting ***Stramit Longspan***® cladding, care should be taken to ensure that the load is spread to prevent damage. Packs must never be placed onto unclad purlins except directly above portal frames.

Handling/Storage

Stramit Longspan® cladding should be handled with care at all times to preserve the product capabilities and quality of the finish. Packs should always be kept dry and stored above ground level while on site. If the sheets have become wet, they should be separated, wiped and placed in the open to promote drying.

Installation

Fasteners

All fastening screws must conform to AS3566 – Class 3. They are to be hexagon headed and must be used with neoprene washers. For connecting to purlins or top hats use:

For steel (0.75bmt or greater) – No.12 x 45mm self-drilling and threading screws for crest fixing

– No.10 x 16mm self-drilling and threading screws for pan fixing to walls

For timber (F11 or better) – No. 12 x 65mm type 17 screws for crest fixing

– No.10 x 25mm type 17 screws for pan fixing to walls

Side Laps

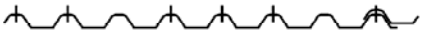
– No. 8 x 12mm 'S' point screws, or

– 3.2mm diameter sealed aluminium pop rivets

Fastener Locations

Stramit Longspan® cladding can be fixed with either 3, 4 or 5 fasteners per sheet at each batten/purlin to meet the required performance values, as shown below:

CREST FASTENER LOCATIONS

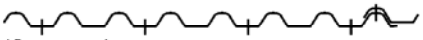


5 Fasteners per sheet

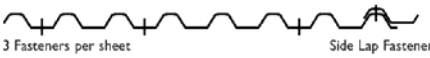
4 Fasteners per sheet

3 Fasteners per sheet — Side Lap Fastener

VALLEY FASTENER LOCATION (WALLS ONLY)



4 Fasteners per sheet



3 Fasteners per sheet — Side Lap Fastener

Installation

Stramit Longspan® cladding is readily installed with or without fibreglass insulation blanket. If practical lay sheets in the opposite direction to prevailing weather.

Installation of ***Stramit Longspan***® cladding is a straight-forward procedure using the following fixing sequence:

1) Ensure all purlins are in line and correctly installed and that mesh and blanket (if specified) are in place.
2) Position and fix the first sheet ensuring the correct sheet overhangs (minimum 50mm). Ensure that screws are not overtightened.
3) Continue to fix subsequent sheets checking that sheet ends at the lower edge are exactly aligned.

   It is important that the underlap of one sheet does not protrude beyond the overlap of the next – if this is unavoidable, the underlap must be trimmed locally or water 'drawback' may occur.
4) Measure the overall cover width at top and bottom of the sheets from time to time to avoid 'fanning'.
5) For roof spans exceeding 900mm and wall spans exceeding 1200mm, stitch the sidelaps at midspan.
6) Turn up the pans at the upper roof edge and turn down the pans at the lower edge and install flashings.
7) Clean up the roof after each days work, removing all screws, cuttings, swarf etc, and leave roof clean and watertight.

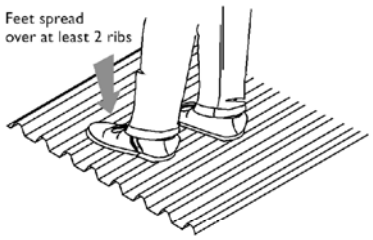
Insulation

Stramit Longspan® cladding is suitable for use with insulating blanket. Glasswool blanket up to 50mm thick can be readily used. Increased thicknesses require longer fasteners and greater care in installation.

Walking

As with all roofing products, we recommend extra caution be taken when walking on the roof. When walking on ***Stramit Longspan***® cladding roofing always wear flat rubber soled shoes and place feet only on the ribs, taking care to avoid the last rib or two near edges of the metal roof area.

Walk only on ribs



Good Practice

Stramit recommends that good trade practice be followed when using this product, such as that found in Australian Standards Handbook HB39.

Cutting

Stramit Longspan® cladding can be easily cut, where required, using a power saw with a steel cutting blade or a power nibbler and, for localised cutting, tin snips. Avoid the use of abrasive discs as these can cause burred edges and coating damage. Please dispose of any off-cuts carefully.

Additional Information

Maintenance

Exterior surfaces of metal products unwashed by rain can benefit from occasional washing to remove build-up of corrosive salts. Walls beneath eaves or awnings are such a situation.

Further Information

As well as our standard range of Technical Manuals, Installation Leaflets, Case Studies and other promotional literature Stramit has a series of Guides to aid design.

Please contact your nearest Stramit location for any of these guides, or other literature.

References

In preparing this document reference has been made to:

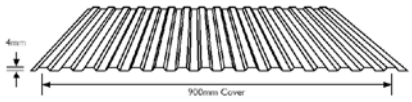
- Standards Australia Handbook – HB39
  (Installation code for metal roof and wall cladding)
- BlueScope Steel – Technical Bulletin TB-4
  (Maintenance of Colorbond prepainted steel roofing)
- BlueScope Steel – Technical Bulletin TB-1
  (Steel roofing and walling products – selection guide)

Stramit
Building Products

The Stramit web page can be found at:
www.stramit.com.au
Details of many ***Stramit***® products can also be seen on the RAIA site 'Product Selector' at:
www.selector.com.au

contact numbers for information		prices	availability products coating colours	general other	technical advice product data
SYDNEY Cnr Erskine Park & Mamre Roads, Erskine Park NSW 2759	phone fax	**(02) 9834 0909** (02) 9834 0988		**(02) 9834 0900** (02) 9834 0977	
CANBERRA 4 Bass Street, Queanbeyan NSW 2620	phone fax	**(02) 6297 3533** (02) 6297 8089			
COFFS HARBOUR 6 Mansbridge Drive, Coffs Harbour NSW 2450	phone fax	**(02) 6652 6333** (02) 6651 3395			**(02) 9834 0900** (02) 9834 0977
NEWCASTLE 17 Nelson Road, Cardiff NSW 2285	phone fax	**(02) 4954 5033** (02) 4954 5856			
ORANGE 51 Leewood Drive, Orange NSW 2800	phone fax	**(02) 6361 0444** (02) 6361 9814			
MELBOURNE - KILSYTH 180-186 Colchester Road, Kilsyth VIC 3137	phone fax	**(03) 9721 8333**		**(03) 9721 8333** (03) 9721 8347	
MELBOURNE - BAYSWATER 491 Mountain Highway, Bayswater VIC 3135	phone fax	**(03) 9722 5555** (03) 9722 5519	**(03) 9722 5500** (03) 9722 5538		
MELBOURNE - PRESTON 219 Dundas Street, Preston VIC 3072	phone fax	**(03) 9484 0193** (03) 9484 5060			
MELBOURNE - MULGRAVE 2 Faigh Street, Mulgrave VIC 3170	phone fax	**(03) 9560 1588** (03) 9560 7840	**(03) 9560 1588** (03) 9560 4606		
ALBURY 109 Boronia Street, Albury NSW 2640	phone fax	**(02) 6025 2133** (02) 6025 6349			**(03) 9560 1588** (03) 9560 4606
BENDIGO Ramsay Court, Kangaroo Flat VIC 3555	phone fax	**(03) 5447 8455** (03) 5447 9677			
HOBART Farley Street, Derwent Park TAS 7010	phone fax	**(03) 6272 4500** (03) 6272 0967			
ADELAIDE 11 Stock Road, Cavan SA 5094	phone fax	**(08) 8262 4444** (08) 8262 6333			
BRISBANE 57-71 Platinum Street, Crestmead QLD 4132	phone fax	**(07) 3803 9999** (07) 3803 1499			
TOWNSVILLE 402-408 Bayswater Road, Garbutt QLD 4814	phone fax	**(07) 4779 0844** (07) 4775 7155			
CAIRNS 83 Kenny Street, Portsmith QLD 4870	phone fax	**(07) 4031 4064** (07) 4031 4069			
MACKAY Brickworks Court, Glenella QLD 4740	phone fax	**(07) 4942 3488** (07) 4942 2343			**(07) 3803 9999** (07) 3803 1499
MARYBOROUGH 10 Activity St, Maryborough QLD 4650	phone fax	**(07) 4121 2433** (07) 4123 3139			
GLADSTONE 25 Beckinsale St, Gladstone QLD 4680	phone fax	**(07) 4972 8455** (07) 4972 8355			
ROCKHAMPTON 174-176 Alexandra St, Nth Rockhampton QLD 4701	phone fax	**(07) 4927 3855** (07) 4922 2857			
DARWIN 55 Albatross Street, Winnellie NT 0820	phone fax	**(08) 8947 0780** (08) 8947 1577			
PERTH 605-615 Bickley Road, Maddington WA 6109	phone fax	**(08) 9493 8800** (08) 9493 8899			
BUNBURY Lot 1 Proffit Street, Bunbury WA 6230	phone fax	**(08) 9721 8046** (08) 9721 8017			

STRAMIT MINIRIB® PANELLING



Design

Applications

Stramit Minirib® panelling has a near flat profile for discreet panel areas. Widely used as a transport siding, portable buildings and internal shed wall lining ***Stramit Minirib***® panelling also finds use for narrow soffits.

Features

- 900mm Cover – for maximum use of material whenever applications permit.
- Easy Fixing – conventional through fixed screws maximise performance and installation.
- Low Rib Height – to allow flexibility in the sheet for architectural treatments.
- Versatility – suitable for a variety of applications in both architectural and industrial markets
- Hi-tensile Steel – for greater damage resistance and performance.

Materials

Stramit Minirib® panelling is a cold roll formed steel product in G550 base material (550 MPa minimum yield stress) with a zinc-aluminium alloy (AZ150) coating in accordance with AS1397 and colour coating available in a range of colours.

STRAMIT MINIRIB® PANELLING – SHEETING MASS (kg/m² of roof area)

thickness BMT	ZINCALUME®	COLORBOND®
0.42	3.62	3.68

Pressures

STRAMIT MINIRIB® PANELLING – SERVICEABILITY LIMIT STATE CAPACITY

span type	*pressure (kPa) at the spans (mm) shown*				
	600	900	1200	1500	1800
internal	3.41	2.39	1.84	1.49	1.25
equal	3.41	2.39	1.84	1.49	1.25
double	3.41	2.39	1.84	1.49	1.25

STRAMIT MINIRIB® PANELLING – STRENGTH LIMIT STATE CAPACITY (Non-cyclonic)

span type	*pressure (kPa) at the spans (mm) shown*				
	600	900	1200	1500	1800
internal	5.79	2.67	1.56	1.04	0.74
equal	5.79	2.67	1.56	1.04	0.74
double	5.79	2.67	1.56	1.04	0.74

Tables are based on testing to AS1562 and AS4040 parts 0, 2 and 3. Internal spans must have both end spans 20% shorter. Values only valid for use with steel support members of 0.75mm or thicker.

Impact

For wall areas likely to be subject to human impact, sheeting spans should be reduced. Impact loads will vary considerably and these are not prescribed in Australian Standards. A maximum span of 900mm is suggested for such areas, but this should be adjusted dependent upon the exposure and importance of the application.

Spring Curving

Stramit Minirib® panelling is able to be spring curved to a radius as tight as 2000mm for additional architectural versatility. However, at radii of 6000mm or less the support spacing must be reduced to no greater than 600mm.

Stramit Minirib® Fasteners

All fasteners should conform with AS3566 – Class 3 and be compatible with the cladding material used.

For steel
– No. 12 x 20mm hex head self-drilling, self-tapping screws.

In internal applications, 3.2mm aluminium pop rivets.

For timber
– No. 12 x 25mm hex head self-drilling type 17 screws. Add 10mm to screw length for softwood applications.

Side laps
– No. 8 x 12mm 'S' point screws or 3.2mm sealed aluminium pop rivets.

Stramit Minirib® Fastener Position

For external applications, side lap fasteners are required at 200-300mm centres. At all supports, 4 equally spaced fasteners are required across the sheet including one fastener through or adjacent to the overlap.

For internal applications ***Stramit Minirib***® panelling with spaces of 1000mm or more requires the side lap to be stitched at mid-span.

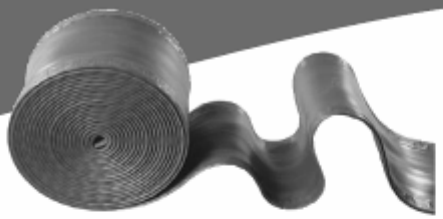
For further installation information see the section later in this manual.

8

Appendix C. Dek-strip flashing

Expandable edged

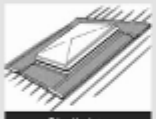
Dekstrip® Flashing



20 YEAR WARRANTY

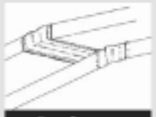
DEKS
A Skellerup Industries Company


Large round or square penetrations


Skylights


Bullnose


Valleys


Box Gutters

benchmark ISO 9001

Dekstrip® forms and stretches

to solve all those flashing problems!

Dekstrip® expandable-edge flashing is the answer to flashing large, curvedor awkward profiles and penetrations. It's ideal for box gutter expansion joints and is the fast, easy and most effective way to flash a bullnose.

- ✓ **Flashes hi-rib & standing seam profiles**
- ✓ **Stretch and form to fit and seal**
- ✓ **Flash between dissimilar materials**
- ✓ **Handles vibration and expansion**
- ✓ **Allows movement on box gutter laps**

Australian made ~ Australian designed

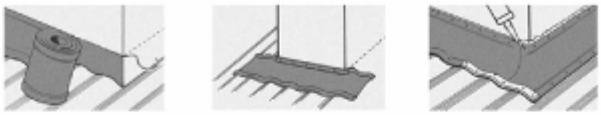
Dekstrip® *Stretch* and Flash

Dekstrip® Flashing

Easy to fix (see www.deks.com.au for instructions)

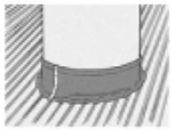
Square Ducts, Chimneys, Skylights

Expand one edge and use separate strips, lapped and joined, to seal around the penetration.



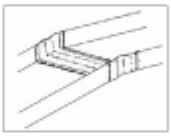
Large Round Pipes

Flash round pipes in one go, stretching the lower edge to fit. Join using fasteners, sealant and/or heat gun.



Expansion Joints

The flexibility of Dekstrip® makes it ideal for joining box guttering. No problems with movement or leaking.

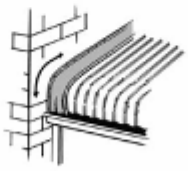


• Sealing with a Heat Gun*

Two overlapping pieces of Dekstrip® can be sealed using a heat gun*, making corner fixing neat and fast (area to be joined by heat must be well supported underneath to provide firm support while rubber is hot). Do not use sharp tools when forming after heating).

* *Suitable for sealing new Dekstrip® only. Use of heat gun applies to Dekstrip® manufactured after July 2004. If in doubt, email info@deks.com.au*

• Flash Dissimilar Materials



Dekstrip® is compatible with most materials and can successfully flash between:

- Brick
- Fibre Cement
- Galvanised Steel
- Aluminium
- Stainless Steel
- Concrete

• Paint to Match Roof

After installation, and preferably after a period of 'weathering', Dekstrip® can be painted with any good quality 100% acrylic paint after priming with an expoxy resin-based primer. See www.deks.com.au for full recommendations.

• Flashing Dissimilar Roof Profiles

When flashing dissimilar roof profiles such as a house roof to a verandah, install as follows:

1. Measure length.
2. Junction gap should be no more than 180mm.
3. Stretch to suit profile on both sides.
4. When satisfied with the shape and fit and there are no stress lines, seal with silicone and screw/rivet fix in the valley/pan of the profile.

Code	Length m	Width mm	Colour
DS23-180	23	180	GREY (EPDM) Thermoplastic EPDM will withstand temperatures from -50°C to 115°C & up to 150°C intermittently
DS23-235	23	235	
DS23-305	23	305	
DS10-180	10	180	
DS10-235	10	235	
DS10-305	10	305	
DS3-235	3.1	235	

Separate strip of aluminium included in all roll lengths except the 310mm

For installation advice and selection guides for other products in the Dektite® range, call +61 3 8727 8800
www.deks.com.au
info@deks.com.au

January 2005

USING Dekstrip® BETWEEN DISSIMILAR MATERIALS

Dekstrip is known to be compatible with the following materials:

Material	Galvanised Steel	Aluminium	Stainless Steel	Concrete	Brick	Fibre Cement
Galvanised Steel	1	1	1	2	2	3
Aluminium	1	1	1	2	2	3
Stainless Steel	1	1	1	2	2	3
Concrete	2	2	2	2	2	4
Brick	2	2	2	2	4	4
Fibre Cement	3	3	3	4	4	4

For materials not shown, please contact the DEKS Techinical Department on +61 3 8727 8800.

1. **Fixing** - self-drilling, washered, fasteners or sealed, washered rivets as recommended by the fastener manufaturer.
   Sealing - neutral cure, low modulus silicone.

2. **Fixing** - metal sides as (1), pre-drill concrete/brick and install a washered self-tapping fastener (e.g. Tapcon style) or an expansion plug type fastener.
   Sealing - select a sealant that will be compatible with all the materials involved.

3. **Fixing** - metal sides as (1), pre-drill fibre cement and use a heavy-duty rivet (3-fold collapsing leg type) to fix into the fibre cement.
   Sealing - select a sealant that will be compatible with all the materials involved.

4. **Fixing** - pre-drill fibre cement and use a heavy-duty rivet (3-fold collapsing leg type) to fix into the fibre cement. pre-drill concrete/brick and install a washered self-tapping fastener (e.g. Tapcon style) or an expansion plug type fastener.
   Sealing - select a sealant that will be compatible with all the materials involved.

Note:

a) Always refer to fastener manufacturer's instructions regarding the installation into dissimilar materials.

b) Always contact the manufacturer of the roof material to ensure that dissimilar materials are compatible and for recommendations on thermal expansion and contraction characteristics.

www.deks.com.au

DEKS
A Skellerup Industries Company

Appendix D. Insulation batts

As purchased through building suppliers in San Jose, California, USA.

WEBFORGE STAIR TREADS AND HANDRAILS

Monowills stanchions
Stair treads

Finding The Right Handrail

MONOWILLS HANDRAILS

Webforge Material Options

STEEL

This is the most commonly used material and is used in all types of applications. Steel is available untreated or powder coated but is usually hot dipped galvanised to AS/NZS4680 to protect against corrosion.

ALUMINIUM

Aluminium is usually used when weight or corrosion is an issue or in conditions where steel is unsuitable. Aluminium handrailing is commonly used in sewerage treatment facilities and commercial and architectural applications. Aluminium can be anodised or powder coated or left as mill finish.

FIBREGLASS

FRP (fibre re-inforced plastic) or fibreglass handrails and stanchions are made to order only. Please contact your local Webforge Sales Office for details.

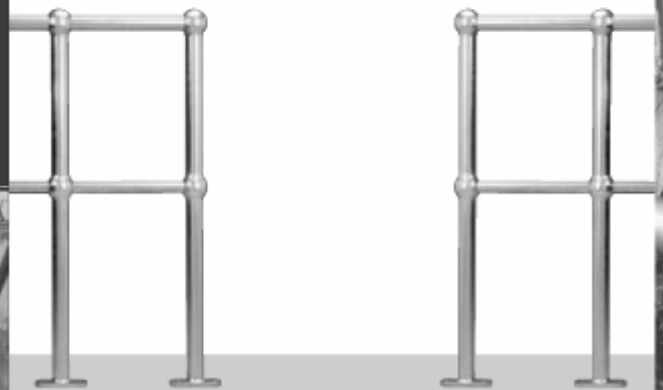
STAINLESS STEEL

Stainless Steel Handrails and Stanchions are made to order only. Please contact your local Webforge Sales Office for details.

Webforge is the sole supplier of the leading handrailing system known as MONOWILLS. It is an economical, strong and simple form of handrailing, which is equally at home in industrial, commercial, municipal and general applications. The standard ranges are made in steel and aluminium.

Webforge can supply complete handrail systems comprising stanchions, rails, bends, and kickplates. Webforge MONOWILLS handrailing can be used in a multitude of applications including stairways, bridges, parking stations, schools, commercial premises, gangways, power stations, sewerage treatment works and marinas. They also meet the requirements of government departments and instrumentalities.

Because of its unique design, the system can be transported and erected quickly and economically in all applications.

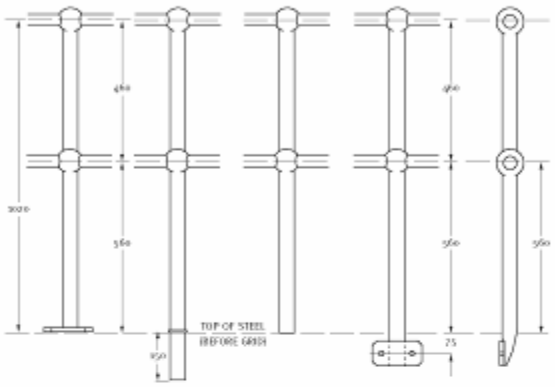


9

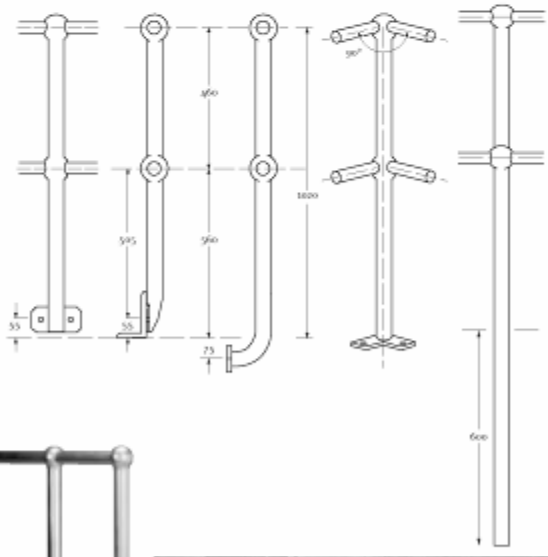
Finding The Right Handrail

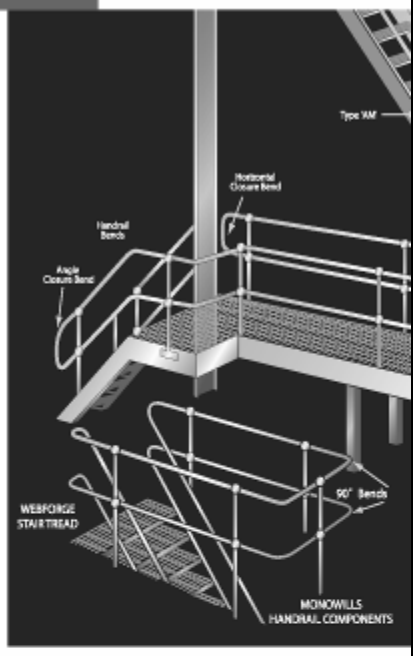
Stanchion Product Range

P Platform | C Cored | W Welded | S Side | S Side



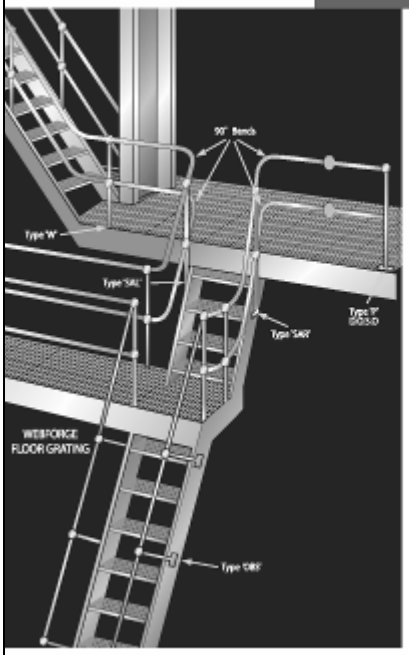
SC Side Conveyor | SC Side Conveyor | SO Side Offset | P UNI Corner Post | IG In Ground



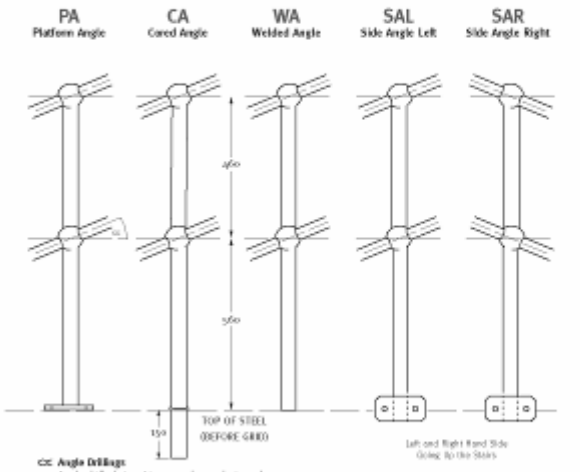


For specification details refer to page 34.

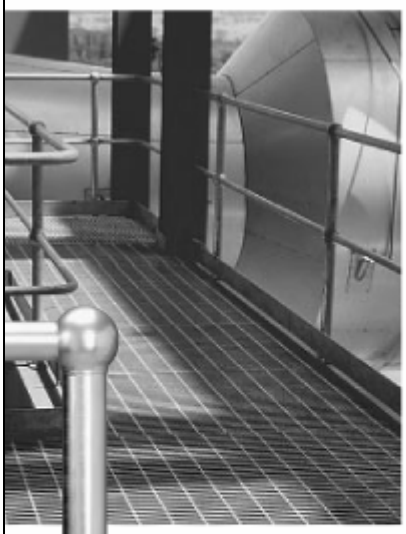
Finding The Right Handrail

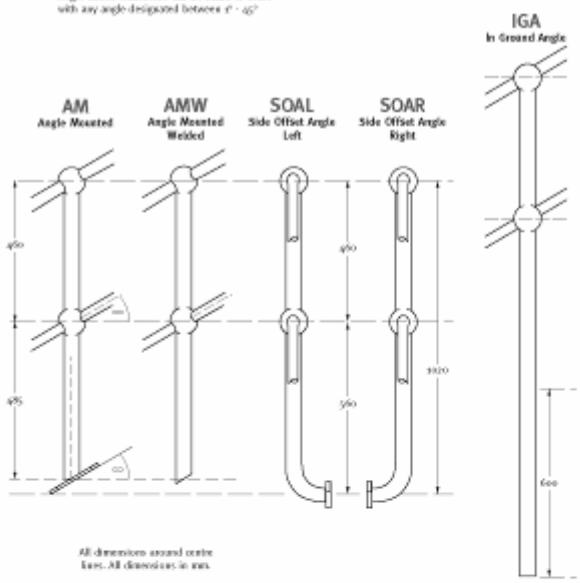


Stanchion Product Range



CC Angle Drillings
Angle drilled stanchions can be made to order with any angle designated between 0° - 45°





All dimensions around centre lines. All dimensions in mm.

Surface Treatment

Steel handrailing is in most cases Galvanised to AS/NZS4680 - Code G to protect against corrosion or available Powder Coated - Code PC.

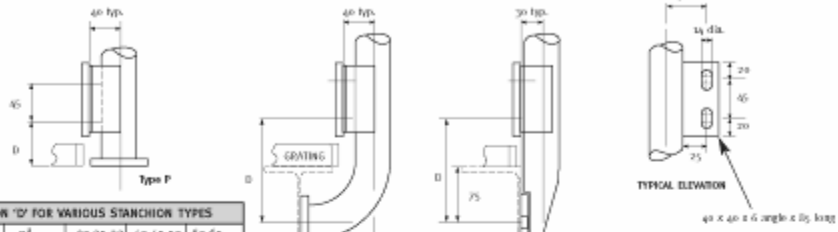
Aluminium handrailing can be Anodised - Code A, Powder Coated - Code PC or left as Mill Finish - Code M.

MONOWILLS HANDRAILS

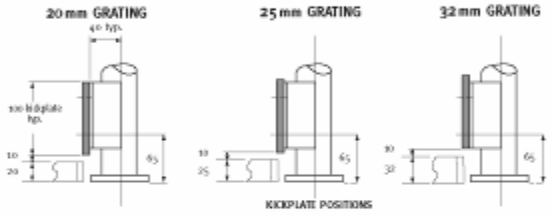
11

Finding The Right Handrail

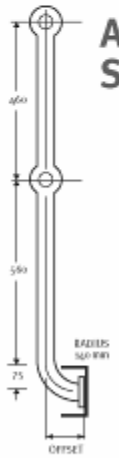
Kickplate Mounting Brackets



DIMENSION 'D' FOR VARIOUS STANCHION TYPES				
Grating Ht. mm	nil	20,25,32	40,45,50	60,65
P, W, C	D = 40	D = 65	D = 80	D = 100
S & SO	D = 115	D = 140	D = 160	D = 175
Slot allow 7mm up/down adjust to kickplate				

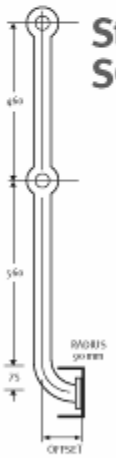


Aluminium SO Type Offsets



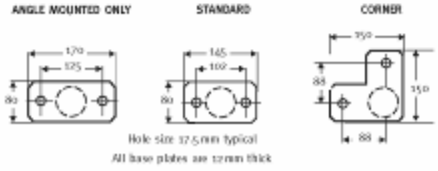
- Standard offset is a minimum 150mm.
- Offsets in excess of 150mm should be checked with the Webforge Sales Office.
- Check with your nearest Webforge sales office for recommended spacings for 'SO' aluminium stanchions.

Steel SO Type Offsets



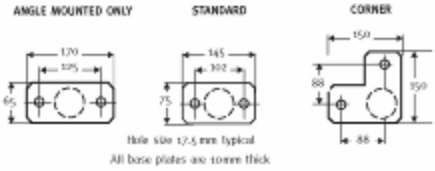
'SO' TYPE OFFSETS			
CHANNELS		UNIVERSAL BEARS	
SIZE	OFFSET	SECTION	OFFSET
150 x 75	130	200UB	130
180 x 75	130	250UB	130
200 x 75	130	310UB	130
230 x 75	130	360UB	135
250 x 90	135	410UB	135
300 x 90	135	460UB	135
380 x 100	135	530UB	135

Aluminium Base Plates



Hole size 17.5 mm typical
All base plates are 12 mm thick

Steel Base Plates



Hole size 17.5 mm typical
All base plates are 10 mm thick

Finding The Right Handrail

MONOWILLS HANDRAILS

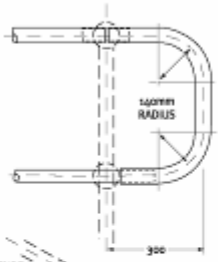
Closures and Bends

Horizontal Closure Bends

Horizontal closure bends are generally manufactured from galvanised tube with a wall thickness of 3.2mm. Standard 90 degree closure bend has 140mm radius. Bends have 300/260mm legs at 460mm centres.

NOTE: Position of horizontal closure bend to (a) stanchion, (b) handrail, (c) kneerail.

NOTE: Kneerail extension giving support to bottom leg of bend.

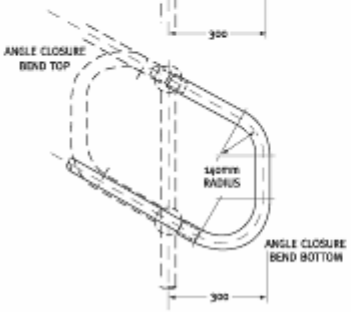


Angle Closure Bends

Angle closure bends have 140mm radius bends with 300/260mm legs at 460mm centres. Angle closure bends are made to order with angle nominated to any angle between 1 degree and 45 degrees.

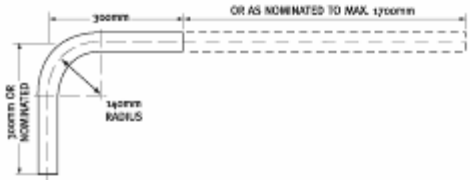
NOTE: Position of angle closure bend to (a) stanchion, (b) handrail, (c) kneerail.

Top and bottom closure bends are not interchangeable.



90 Degree Bends

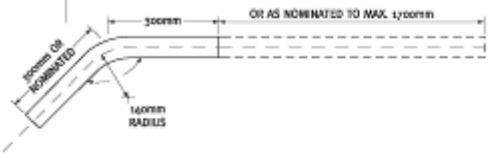
Standard 90 degree bend has 140mm radius with 300mm legs. Non-Standard 90 degree bend has 140mm radius with nominated leg lengths up to a maximum of 1700mm.



Angle Bends

Standard angle bends have a 140mm radius with 300mm long legs. The angles can be made to suit customer requirements. Always specify angles as shown.

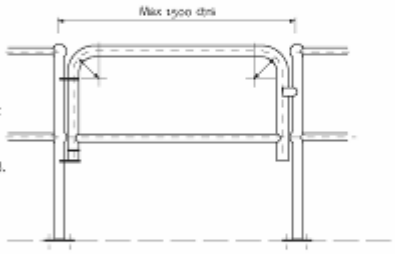
A non standard angle bend has a 140mm radius with nominated leg lengths up to a maximum of 1700mm.



Gates

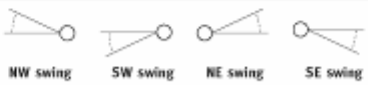
The self closing gate allows entry through the passage way and because of its design will close on release and return to the stop position. The striker plate can be drilled to allow for a padlock or other locking device to restrict entry when not in use. Gates with kickplates can also be supplied.

The self closing gate matches the design of the **MONOWILLS** system as the handrail is manufactured from 32NB pipes with the cross bracing made from 25NB.



Important

When ordering self closing gates, it is **essential** to nominate the swing direction



13

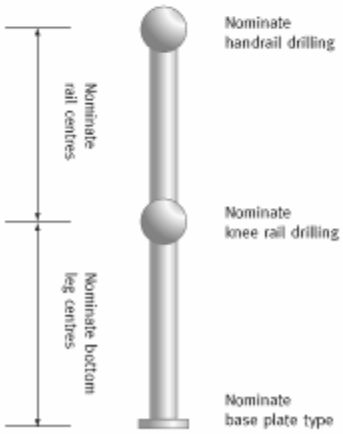
How to Order Stanchions

1. Select the material type.
2. Select the stanchion type from the product range.
3. Select the surface treatment required.
4. Select kickplate mounting bracket option.
5. If side offset type stanchion is required refer to table on Page 12 for the offset dimension.
6. If angle stanchions are required nominate angle and note range is from 0° to 45°.
7. If other than standard drilling is required then specify detail.
8. If other than standard rail centres or heights are required then specify detail.
9. Select the closures and bends required.
10. Specify gate requirements if necessary.

NOTE: Webforge MONOWILLS handrailing system is designed to comply with AS1657. For other codes and specification requirements please refer to your local Webforge Sales Office.

Non Standard Stanchions

Refer to notes 7 & 8.



Finding The Right Stair Tread

STAIR TREADS

Webforge Material Options

STEEL - CODE M

This is the most commonly used material and is used in many types of tread applications. It is used extensively in power stations, refineries, chemical plants for all types of stairways.

ALUMINIUM - CODE A

Aluminium is usually used when weight or corrosion is an issue. Typical applications are in sewerage treatment facilities and other aggressive corrosive environments. Aluminium treads can be anodised or powder coated or left as mill finish.

FIBREGLASS - CODE I or V

FRP (fibre re-inforced plastic) or fibreglass moulded treads are commonly used where a metal product is not suitable. There are two basic types of moulded tread. Code type I uses isopthalic resin and code type V uses vinylester resin. FRP is non-magnetic, has low thermal conductivity is non conductive and non sparking. It is used in corrosive environments and where weight and hygiene may be issues.

STAINLESS STEEL - CODE S

Stainless steel is used in some chemical plant applications but more commonly where hygiene is an issue and foodstuffs are prepared. It has superior corrosion resistance to steel. Stainless steel is usually treated with an electropolishing process. For specific information regarding availability contact your local Webforge Sales Office.

Webforge offer a range of standard treads which will meet all applications.

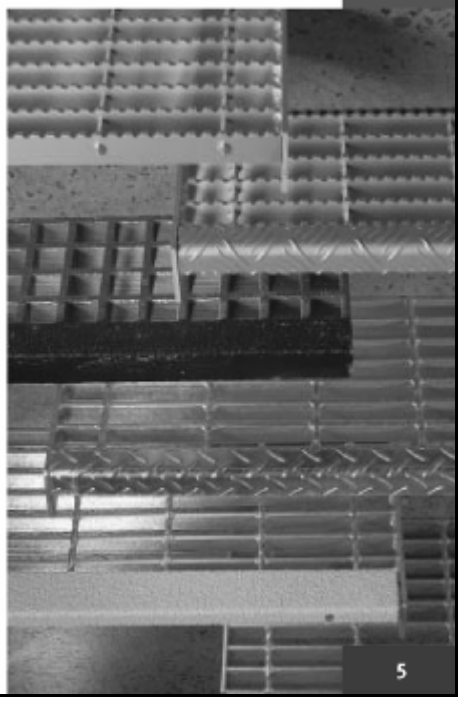
The following tread selections are available.

- The standard tread lengths are 750mm and 900mm and can be bolt in type or weld in type.
- The steel and stainless steel tread widths are 245mm or 285mm. The narrow tread width is used when the stringer member is a small section or the stair angle is steep.
- The standard bolt in end plates for the treads are shown on Page 7.
- The aluminium tread widths are 245mm or 275mm.
- The FRP tread widths are 234mm or 272mm.

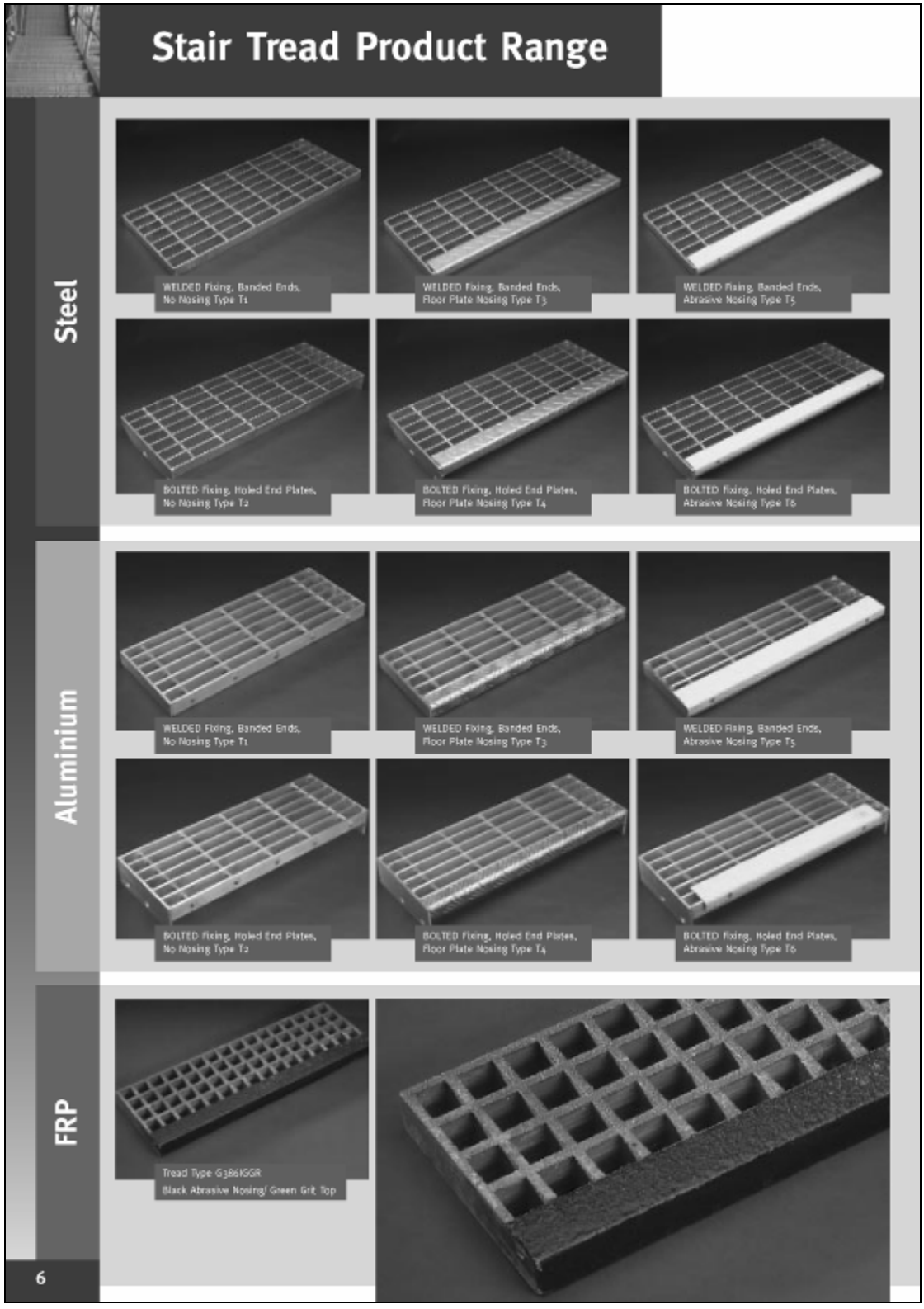
- Treads are made from C325MS (serrated) for steel.
- Treads are made from A325AP (plain) for aluminium.
- Treads are made from G386IGGR for isopthalic FRP or G386VGY for vinylester FRP with an antiskid surface.
- Expanded metal is not commonly used as a tread material.
- Twist rods are purposely non aligned for safety reasons.

Nosing

Webforge recommends that steel, aluminium and stainless steel stair treads are fitted with an abrasive grit yellow nosing. FRP treads are supplied with a black antiskid nosing. This complies with the safety requirements that the edge of the tread should be clearly visible against the background and the tread surface should be slip resistant. Other nosing are available on request.



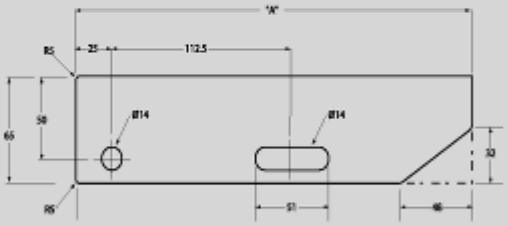
5



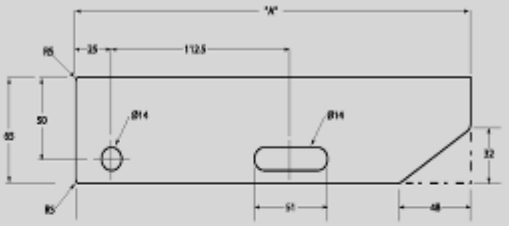
Fixing Details

STAIR TREADS

Standard Tread:	C325MS (32x5 serrated)
Standard Length:	750 or 900mm
Standard Widths:	245 or 285mm
Type T1-T6 C Pattern:	



Standard Tread:	A325AP (32x5 plain)
Standard Length:	750 or 900mm
Standard Widths:	245 or 275mm
Type T1-T6 A Pattern:	

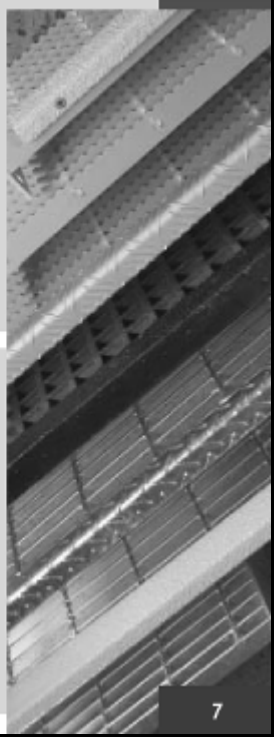


Standard Tread:	G386IGGR
Standard Length:	750
Standard Widths:	234 or 272mm

40 long x 6 dia. hex head bolt, nut and washer, stainless steel Gr. 316

Saddle clip - type M Gr. 316 stainless steel

40 min. recommended bearing surface



7

How To Order Stair Treads

Steel

1. Nominate the stair tread width - 245mm or 285mm.
2. Specify the tread length - 750 or 900mm.
3. Specify the nosing required.
4. Specify the type of fixing (bolt in or weld in).
5. Specify the type of treatment required.
6. For tread information refer to the technical data section on page 30.

Example

T2 - C325 - MSG

245mm wide x 900mm long

Aluminium

1. Nominate the stair tread width - 245mm or 275mm.
2. Specify the tread length - 750 or 900mm.
3. Specify the nosing required.
4. Specify the type of fixing (bolt in or weld in).
5. Specify the type of treatment required.
6. For tread information refer to the technical data section on page 30.

Example

T2 - A325 - AP

275mm wide x 750mm long

Fibreglass

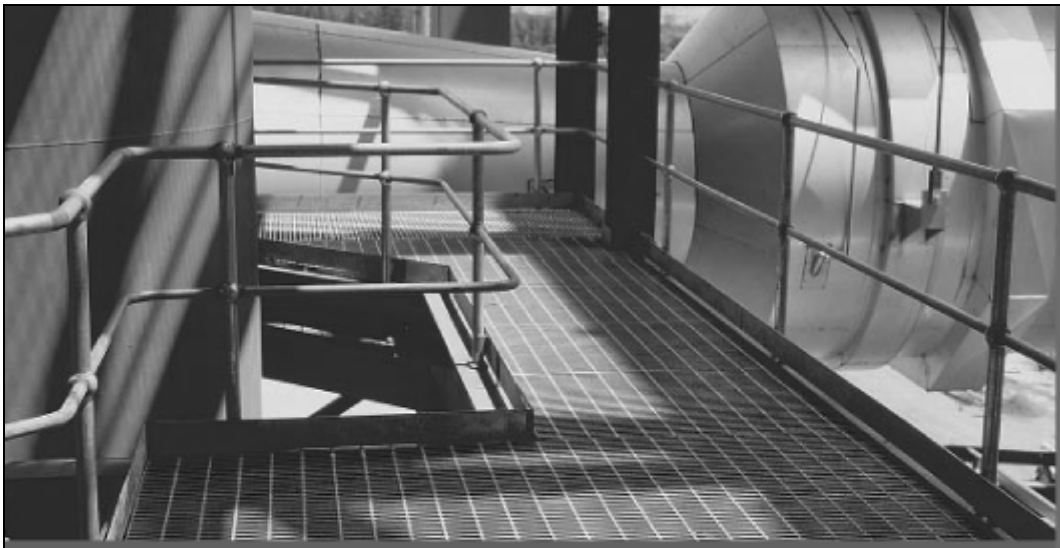
1. Nominate the stair tread width - 234mm or 272mm.
2. Tread lengths are 750mm.
3. Material type isopthalic or vinylester.

Example

G386IGGR

234mm wide x 750mm long

8



Webforge Worldwide Centres

Australia
Webforge (NSW)
73-75 Bassett Street
Mona Vale NSW 2103
Phone: (02) 9997 8555
Fax: (02) 9997 7546
Postal: PO Box 440
Mona Vale NSW 1160
Email: nsw_sales@webforge.com.au

Webforge (QLD)
1149 Kingsford Smith Drive
Pinkenba QLD 4008
Phone: (07) 3260 1064
Fax: (07) 3260 1130
Postal: PO Box 1452
Eagle Farm QLD 4009
Email: QLD_sales@webforge.com.au

Webforge (VIC)
Factory 2, 142-146 Fairbank Rd
Clayton South VIC 3169
Phone: (03) 9551 1911
Fax: (03) 9558 0730
Postal: Private Bag 155
Clayton South VIC 3169
Email: VIC_sales@webforge.com.au

Webforge (WA)
24 Tennant Street
Welshpool WA 6106
Phone: (08) 9361 8933
Fax: (08) 9361 7057
Postal: PO Box 151
Bentley WA 6102
Email: WA_sales@webforge.com.au

New Zealand
Webforge (NZ) Ltd
23 Kelvin Grove Road
Palmerston North NZ
Phone: (06) 356 1246
Fax: (06) 356 7782
Postal: PO Box 1506
Palmerston North NZ
Email: NZ_sales@webforge.com.au

Internet
www.webforge.com.au

Disclaimer:
While Webforge has taken all reasonable care in preparing this brochure, Webforge takes no responsibility for loss resulting from relying on its contents. Customers should make their own enquiries as to whether any products described in this brochure are suitable for their intended use. Information in this brochure may change without notice.

Singapore
Webforge (Singapore) Pte Ltd
No. 257, Jalan Ahmad Ibrahim
Singapore 629147
Phone: 65 861 3611
Fax: 65 861 8344
Email: webforge@singnet.com.sg

Philippines
Webforge Philippines Inc
Main Ave cnr Hologram Street
Light Industry & Science Park 1
Cabuyao, Laguna
PO Box 3928, Makati City 1259
Philippines
Phone: 63 49 543 0441
Fax: 63 49 543 0440
Email: webforge@info.com.ph

Indonesia
PT Webforge Indonesia
Kawasan Industri Jababeka
Jl. Jababeka V Kav V-9
Cikarang-Bekasi 17530
PO Box 387, Bekasi 17038
Indonesia
Phone: 62 21 893 4513
Fax: 62 21 893 4516
Email: webindo1@rad.net.id

Malaysia
Webforge (KL) SDN BHD
Lot 3, Jalan Gudang 16/9
Section 16, 40700 Shah Alam
P.O. Box 7601, 40720 Shah Alam
Selangor Darul Ehsan
Malaysia
Phone: 60 3 5519 0652
Fax: 60 3 5519 0749
Email: webkl@tm.net.my

China
Guangzhou Webforge Grating Co Ltd
Jiehua 3rd Street
Guangzhou Economic &
Technological Development Zone
Guangzhou 510730
China
Phone: 86 20 8221 2791
Fax: 86 20 8221 2792
Email: gmgco@mx2.gd.cei.gov.cn

Wuxi Webforge Grating Co.
Lot 40B, Wuxi National High New Tech.
Industrial Development Zone
Wuxi, Jiangsu, P.C. 214028
China
Phone: 86 510 521 1188
Fax: 86 510 521 5188
Email: webwuxi@public1.wx.js.cn

Thailand
Webforge (Thailand) Ltd
(Head Office & Factory)
Amata City Industrial Estate
7/110 Moo 4
Tumbol Mapyangporn
Amphur Pluakdaeng
Rayong 21140
Thailand
Phone: 66 38 956 099
Fax: 66 38 956 097
Email: sales@webforge.co.th

(Sales & Marketing)
26th Floor, Unit E, North Tower
Jewelry Trade Centre Building
919/264 Silom Road
Bangrak, Bangkok 10110
Thailand
Phone: 66 2 630 0861
Fax: 66 2 630 0860

WEBFORGE

Patent and Registered Trademark February 2003

Appendix E. Service Crane (N/A Lick APF)

This section refers to a customer option, not purchased by Lick UCO for the APF facility. The information is provided for UCO future reference if applicable.

Important. The safe working load (SWL) of the service balcony is 400 kg and this takes precedence over the capacity of the crane. Do not attempt to lift more than 400 kg with the crane.

Palfinger PC3300B truck mounted crane features:

- double acting lift cylinder
- hydraulic outreach to 4.68 m
- hydraulic slew-slew angle 340°
- load hold valve on lift cylinder and extension cylinder
- four spool remote mounted valve bank with pressure test point
- pressure gauge
- emergency off switch
- Pullmaster PL2 hydraulic winch (with 30 m × 9 mm non twist rope and hook) fitted to outer boom
- 240 volt, 3 phase 60hz hydraulic power pack
- Hyspin 46 hydraulic fluid.

Product Data

Castrol Hyspin® AWS Range

Anti-Wear Hydraulic Oils

Description

Castrol Hyspin AWS Hydraulic Range are a series of premium quality, mineral oil-based lubricants with excellent stability & anti-wear performance. They are designed to extend pump life in high premium industrial hydraulics, and bearings lubricated by circulation, bath & ring oiling.

Application

- **Hyspin AWS Hydraulic Range** are designed to be used on all lubrication applications where anti-wear oils are specified by equipment manufacturers or called for by system requirements.
- Used in circulation systems where pumps, bearings and gears are common.
- **Hyspin AWS Hydraulic Range** is used in applications requiring products meeting Denison HF_O requirements.

Advantages

- Highly resistant to oxidation, which prevents sludging and varnishing and provides long service life.
- Provides excellent corrosion resistance for internal surfaces from entrained air and moisture-induced corrosion.
- Inhibited to prevent foam under the most rigorous operating loads.
- Anti-wear inhibitors prevent excessive wear on load-bearing surfaces.

Characteristics

Test Results	Hyspin AWS 22	Hyspin AWS 32	Hyspin AWS 46	Hyspin AWS 68	Hyspin AWS 100	Hyspin AWS150
ISO Viscosity Grade	22	32	46	68	100	150
Viscosity, ASTM D-445,						
@ 40°C, mm^2/sec	22.9	30.4	45.89	67.8	103.6	152.9
@ 100°C, mm^2/sec	4.4	4.18	6.72	8.5	11.8	15.1
Viscosity Index, ASTM D-2250	105	100	100	98	98	98
Flash Point, ASTM D-92, °C / °F	205 / 401	210 / 411	215 / 420	226 / 440	226 / 440	232 / 450
Copper Strip Corrosion ASTM D-130, 3 hrs. @100°C	1B	1!B	1B	1B	1B	1B
Rust, ASTM D-665, A&B	Pass	Pass	Pass	Pass	Pass	Pass
Pour Point, ASTM D-97 C/F	-32/-26	-32/-26	-26/-15	-26/-15	-15/5	-15/5
Specific Gravity @ 60°F, ASTM D-1298	0.86	0.87	0.88	0.88	0.89	0.89

User advice

Hyspin AWS Hydraulic Range are compatible with all oil-resistant seals and all metals. These oils can be added to competitive products. However, to optimize performance, drain reservoirs completely and refill with the OEM recommended viscosity grade. Consult your Castrol Sales Engineer for questions regarding compatibility.

Castrol Hyspin AWS Range
03.14.2005, Version Number 2.0
Hyspin AWS Range and the Castrol logo are trademarks of Castrol Limited.

Castrol Industrial North America Inc.
150 W. Warrenville Road
Naperville, IL 60563
Tel (877) 641 1600
Fax (877) 648 9801

www.castrol.com/industrial

PALFINGER

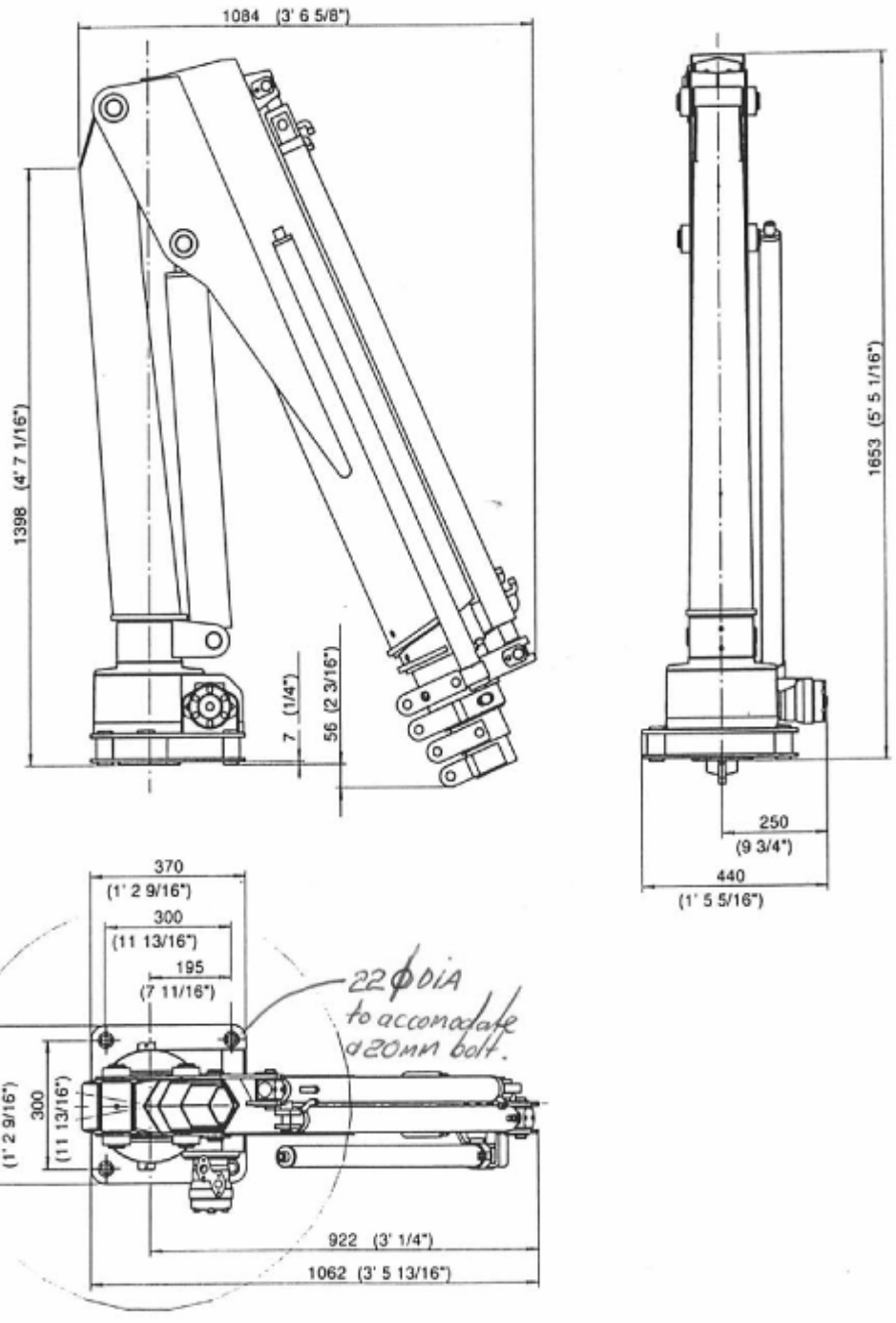
Technische Information
Technical information
Information technique

PC 3300 – Technische Daten – Specifications – Donnees techniques

DT0330/03

Seite / Page / Feuille 02

Ausgabe / Edition / Edition 1/04/99



Konstruktionsänderungen vorbehalten, fertigungstechn. Toleranzen müssen berücksichtigt werden.
Subject to change, production tolerances have to be taken into account.
Les tolerances relatives a la technique de production doivent etre prises en compte.

MODEL PL2 PLANETARY HYDRAULIC WINCH

DESCRIPTION

The **PULLMASTER** Model PL2 is a high performance, high efficiency planetary winch, having equal speed in both directions of rotation. The cable drum of this unit conforms with OSHA recommendations, making this winch especially suitable for applications where a load is raised or lowered.

The **PULLMASTER** Model PL2 is powered by a hydraulic gear motor and a reduction ratio of 40.5:1 is established by two planetary stages. The automatic multi-disc brake is "Spring Applied - Pressure Released". An over-running clutch, between the motor drive shaft and the brake assembly, permits free rotation in the "Hoisting" direction without affecting the brake. During "Lowering" operation the over-running clutch locks, causing the brake discs to rotate between a series of divider discs. Dynamic braking is then achieved by modulation of the winch control valve handle. When the control is returned to neutral position the brake applies automatically. During lowering of a load, temperature generated by the disc brake is dissipated by a flow of hydraulic fluid supplied from the hydraulic motor. This circulation flow is vented internally and therefore, there is no need for an external vent line. A counter-balance valve is not required for smooth and positive "Down" control of the **PULLMASTER** Model PL2 planetary winch.

All moving parts of the **PULLMASTER** Model PL2 planetary winch are totally enclosed and run in an oil bath. Anti-friction bearings are used on all turning components, assuring long, trouble free service with a minimum requirement for maintenance.

PERFORMANCE

- Maximum operating volume = 7.7 (US) gpm (29 l/min)
- Drum rpm at maximum volume = 49
- Maximum operating pressure = 2200 psi (152 bar)
- Drum torque at maximum pressure = 7095 lb-in (802 Nm)

MODEL NUMBER	BARE DRUM		MEAN DRUM (THEORETICAL)		FULL DRUM	
	LINE PULL	LINE SPEED	LINE PULL	LINE SPEED	LINE PULL	LINE SPEED
PL2-12-7-1	2200 lb 9.8 kN	83 fpm 25 m/min	1925 lb 8.6 kN	95 fpm 29 m/min	1650 lb 7.3 kN	110 fpm 34 m/min

When the **PULLMASTER** Model PL2 is installed in an existing hydraulic circuit with a lesser volume or pressure the performance will change. Maximum pressure and maximum hydraulic volume must not be exceeded. Performance graphs for line pull vs. oil pressure and line speed vs. oil volume, are available upon request.

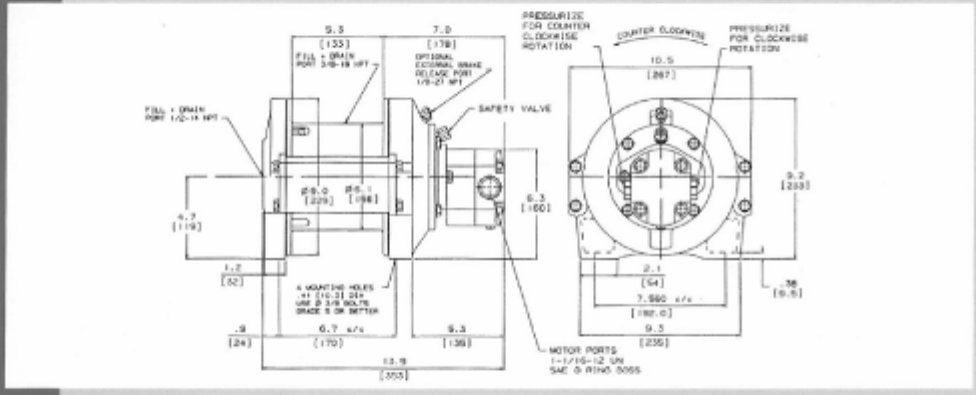
CABLE STORAGE

CABLE STORAGE CAPACITY FOR WIRE ROPE

MODEL NUMBER	DRUM SIZE			WIRE ROPE DIAMETER*				
	BARREL	FLANGE	LENGTH	1/8 in	3/16 in	1/4 in	5/16 in	3/8 in
PL2-12-7-1	6 1/8 in 156 mm	9 in 229 mm	5 1/4 in 133 mm	745 ft 227 m	318 ft 97 m	172 ft 52 m	122 ft 37 m	84 ft 25 m

* Standard cable anchor is suitable for 1/4 - 3/8 inch diameter wire rope. For safety, 3 - 4 wraps of wire rope must be maintained at all times.

DIMENSIONS



PULLMASTER planetary winches are covered by a liberal warranty. Parts and repair service are available from authorized **PULLMASTER** distributors throughout Canada, the United States and most overseas areas.

IMPORTANT
PULLMASTER planetary winches are neither designed nor intended for installation on equipment used in lifting or moving of personnel.

PULLMASTER planetary winches are available for larger line pull capacities. Options are provided on some models for "Rapid Reverse", "Freespooling", "External Brake Release" and different drum sizes.

DISTRIBUTOR

For more information write to:
PULLMASTER WINCH CORPORATION
8247 - 130 STREET, SURREY, B.C. CANADA V3W 7X4
TELEPHONE: (604) 594-4444 • FAX: (604) 591-7332

PMC 187 REV. 960329 *Specifications / Dimensions subject to change without notice and incurring obligation.* PRINTED IN CANADA

Appendix F. Sheltercoat Roof & Deck 2-Part paint

1st coat:	Sheltercoat Roof & Deck Solvent Primer
2nd coat:	Sheltercoat Roof & Deck 2-Part

Shelter waterproofing membranes

Sheltercoat
External Liquid Membranes

Sheltercoat Solvent Based Primer

DESCRIPTION

Sheltercoat Primer S is a solvent based, acrylic primer which is designed to lock particles on the substrate to achieve maximum adhesion. It has excellent durability and is a low viscosity, acrylic binder that seals absorbent floors and penetrates dust.

TYPICAL APPLICATIONS

- New and old concrete
- Timber
- Compressed fibreboards
- Primer for acrylic coatings

APPLICATION REQUIREMENTS

General

Do not apply Sheltercoat Primer S if the temperature is below 5°C or above 35°C.

Substrate preparation

The surface to be coated should be dry, clean, sound and free from oil, grease and flaking paint. New concrete should be left a minimum of 28 days before application commences. All cracks or holes exceeding 2mm are to be repaired before application commences.

APPLICATION SPECIFICATION

Apply with brush, long nap roller or conventional spray. Ensure that the coating is applied evenly at the recommended coverage rates. Allow a drying time of at least one hour.

COVERAGE

Apply at 5 to 8m² per litre on horizontal and vertical surfaces.

PACKAGING

20L Metal Pails.

CLEAN UP

Clean all equipment in general purpose thinners immediately after use.

STORAGE

Sheltercoat Primer S must be stored above 6°C.

SHELF LIFE

One year in unopened containers stored at 20°C.

SAFETY DIRECTIONS

Avoid contact with skin and inhalation of the vapour. Provide adequate ventilation. Keep out of reach of children. If swallowed contact a doctor or Poisons Information Centre. Contact Ardex for specific applications and material safety data sheet.

Sheltercoat Water Based Primer

DESCRIPTION

Sheltercoat Primer W is a red pigmented water based, acrylic primer system which creates a positive bond between the substrate and most water based coatings.

TYPICAL APPLICATIONS

- New and old concrete
- Timber
- Compressed fibreboards
- Primer for acrylic coatings

APPLICATION REQUIREMENTS

General

Do not apply Sheltercoat Primer W if the temperature is below 10°C or above 35°C.

Substrate Preparation

The surface to be coated should be dry, clean, sound and free from oil, grease and flaking paint. New concrete should be left a minimum of 28 days before application commences. All cracks or holes exceeding 2mm are to be repaired before application commences.

APPLICATION SPECIFICATION

Apply with brush, long nap roller or conventional spray. Ensure that the coating is applied evenly at the recommended coverage rates. Allow a drying time of at least one hour.

COVERAGE

Apply at 5 to 8 m² per litre on horizontal and vertical surfaces.

PACKAGING

20L PVC Pails.

CLEAN UP

Clean all equipment in fresh water immediately after use.

SHELF LIFE

One year in unopened containers stored at 20°C.

STORAGE

Sheltercoat Primer W must be stored above 6°C.

SAFETY DIRECTIONS

Avoid contact with skin and inhalation of the vapour. Provide adequate ventilation. Keep out of reach of children. If swallowed contact a doctor or Poisons Information Centre. Contact Ardex for specific applications and material safety data sheet.

6/11 March 2002

ARDEX

6

Shelter waterproofing membranes

Sheltercoat
External Liquid Membranes

Roof & Deck – Two Part

PRODUCT DESCRIPTION

Sheltercoat Roof & Deck – Two Part is a tough, UV stable, mildew resistant and flexible liquid applied waterproofing membrane. It has been specifically formulated for exposed situations, and is available in a range of colours. The reinforced liquid component eliminates the need for reinforcement mat in most situations. In heavy foot traffic areas a layer of polyester mat and a final coat of Sheltercoat Protective Finish or Tufftex should be incorporated into the system.

SYSTEM

Light foot traffic areas
(ie. occasional foot traffic)
Sheltercoat Primer
(water or solvent based)
Sheltercoat Roof & Deck
(first coat)
Sheltercoat Roof & Deck
(second coat)
Optional: Sheltercoat
Protective Finish

Medium-high foot traffic areas
(ie. regular foot traffic)
Sheltercoat Primer
(water or solvent based)
Sheltercoat Roof & Deck
(first coat)
Polyester reinforcement mat
Sheltercoat Roof & Deck
(second coat)
Sheltercoat Roof & Deck
(third coat)
Sheltercoat Protective Finish

FEATURES/BENEFITS

- Provides tough, hardwearing surface
- Flexible
- UV & fungus resistant
- Easy, quick to apply
- Choice of colours
- Optional Protective Coat
- Safe to use, low odour & easy cleaning

Sheltercoat Protective Finish is a tough protective coating available in a range of decorative colours. When applied over Sheltercoat Roof & Deck, the Protective Finish greatly improves wearability, ease of cleaning and surface appearance.

ACCEPTABLE SUBSTRATES

- Concrete, renders and screeds
- Masonry, concrete & AAC blocks
- Fibre cement sheets (external grade only)
- Preprimed metal & corrugated roofs (excluding plastic and aluminium roof sheeting)
- Structural plywood (PAA branded) or marine plywood

For use over existing paints, membranes, covering materials, and any other substrates contact Ardex Building Products for advice.

TYPICAL APPLICATIONS

External decks & floors, rooftops (new & existing), podiums, parapets
Sheltercoat Roof & Deck is also ideal for areas that will be subjected to light foot traffic before being tiled.

LIMITATIONS

Do not use the product in the following situations:

- Areas subject to vehicular traffic
- When rain appears imminent
- Where solvent or petroleum based products could be spilled
- Where the surface temperature is below 5°C or greater than 35°C

Do not attempt to thin down the mix with water, cement etc. Decks or balconies must have adequate falls. Ensure sharp edges of table or chair legs are protected. For substrates or situations other than those listed contact Ardex

6/3 March 2002

BASIC APPLICATION INSTRUCTIONS

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- All areas to be waterproofed must have sufficient provision for drainage and falls of at least 1:80 or 25mm in 2m.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (levelled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Dense concrete (refer Priming) should be roughened by mechanical means.

Mixing

Mixing ratio is 1:1 by weight (ie. 10kg liquid to 10kg powder). Mix with a slow speed mechanical stirrer until there are no lumps in the mixture. Allow to stand for 5 minutes, then re-stir before use.

Priming

To achieve proper adhesion it is critical to select the appropriate primer. Dense or steel trowelled concrete, or concrete that has been treated with an additive will normally require the use of Sheltercoat solvent based primer to achieve proper adhesion.
Check the density of the substrate by pouring a small amount of water onto the substrate. If the substrate absorbs the water then Sheltercoat water based primer can be used. If however, the water beads on the surface of the substrate the solvent based primer is recommended. Dense concrete must be mechanically roughened before priming.
Apply one coat of Sheltercoat Primer (water or solvent based) by brush or roller to all areas to be waterproofed. Two coats are required when priming AAC or other highly porous substrates. Allow the primer to be completely dry prior to the application of Sheltercoat Roof & Deck. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate.
Prime metal surfaces with a suitable metal primer. Plastic (eg. PVC) pipes should be primed with a solvent based PVC primer.

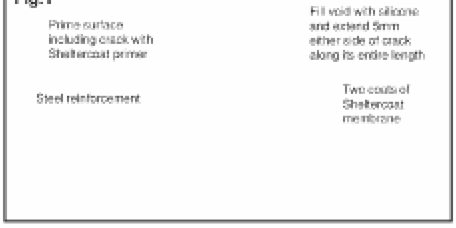
Application

Ardex recommends using a short pile roller (5mm) for applying Sheltercoat Roof & Deck to achieve the best results. Ensure the roller is fully saturated and do not press the roller too hard when applying.

Crack preparation

Cracks <2mm (refer Fig. 1): clean and remove any loose particles in the crack. Prime the area carefully before patching the crack with neutral cure silicone sealant. Extend the silicone 5mm either side of the crack along its entire length. Apply two coats of Sheltercoat Roof & Deck over the crack to achieve a minimum dry film thickness of 1.2mm.
Cracks 2-6mm: prepare the crack and apply the silicone as

Fig.1



ARDEX

6

Sheltercoat
External Liquid Membranes

Shelter waterproofing membranes

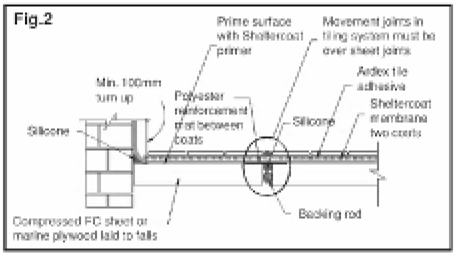


Fig.2

described above. Apply a 300mm wide band of mixed Sheltercoat Roof & Deck along the entire length of the crack. Place a 200mm wide band of polyester reinforcement mat into the wet membrane. Remove any creases or air pockets in the mat. Immediately apply a second coat to completely fill the mat.
Cracks>6mm: contact your local Ardex representative.

Movement/construction joints
Movement joints (<6mm): clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 5mm each side of joint. Apply a 300mm wide band of mixed Sheltercoat Roof & Deck along the entire length of the joint and use reinforcing mat as a slip membrane over the joint. Sheet joints should be treated similarly (refer Fig.2).
Construction joints (>6mm): (refer Fig. 3) clean and prime the joint and apply one coat of the membrane to the edge of the joint. Whilst the membrane is wet insert the Joint Bridging Band along the length of the joint. Immediately apply a second coat over the entire bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles on top of the movement joints with an appropriate joint sealant.

Corners & coving areas
After priming apply a generous bead (10mm) of neutral cured silicone sealant in coving areas and corners. Smooth over the silicone so that it extends 5mm up the wall and 5mm over the floor. Apply a first coat of Sheltercoat Roof & Deck to the area and allow the membrane to dry. Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be around 1.2-1.5mm). For heavy foot traffic areas a reinforcing mat is required between coats.

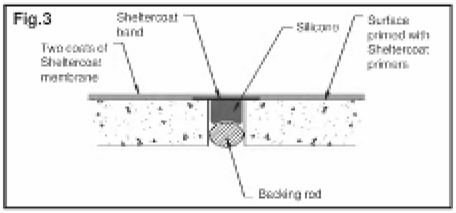


Fig.3

Vertical surfaces
After priming apply two coats of Sheltercoat Roof & Deck in opposite directions on vertical surfaces. Take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat. The top of the parapet should be waterproofed with Sheltercoat or covered with suitable metal capping, render or protective coating (refer Fig.4).

Horizontal surfaces - light (occasional) foot traffic areas
Two coats of Sheltercoat Roof & Deck are required to achieve the correct dry film thickness of 1.2-1.5mm. Apply the first coat over the primed surface and allow it to dry (4 hours at 23°C, 50%RH) before applying a second coat in an opposite direction.
Optional: Sheltercoat Protective Finish is recommended as it will greatly improve the durability and cleanability of the surface. Apply one coat of Sheltercoat Protective Finish to

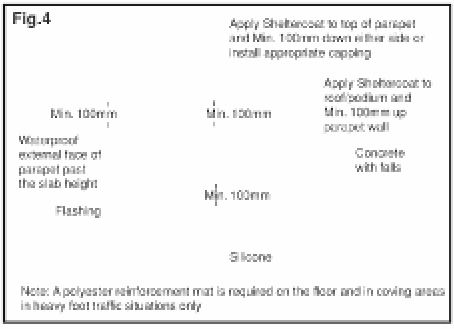


Fig.4

the entire area once the top coat of the membrane is dry (approximately 24 hours).

Horizontal surfaces – medium/heavy (regular) foot traffic areas
In heavy foot traffic areas, three coats of Sheltercoat Roof & Deck, one layer of polyester reinforcement mat and one coat of Sheltercoat Protective Finish are required to achieve the correct dry film thickness of 2-2.5mm.
Apply a first coat of Sheltercoat Roof & Deck over the primed surface. Place the polyester reinforcing mat over the first coat whilst the membrane is still wet. Ensure that the mat is fully bedded into the membrane, with no air pockets and creases. Apply a second coat of Sheltercoat Roof & Deck over the mat as soon as it is fully bedded into the base coat.
Allow the second coat to dry (approx. 24 hours at 23°C, 50%RH) before applying a liberal final coat of Sheltercoat Roof & Deck. Alternatively, bed another layer of mat into the wet second coat of Sheltercoat and apply a third coat of Sheltercoat Roof & Deck. Finally apply one coat of Sheltercoat Protective Finish to the surface once the third coat of the membrane is dry (approx 24 hrs at 23°C, 50%RH). Allow the membrane to fully cure before being subjected to full service foot traffic. This will take approximately 7 days at 23°C and 50% RH.

Roof & balcony penetrations
Place a suitable flanged metal upstand around the penetration. Prime the metal with an appropriate metal primer and allow to dry. Apply a 10mm bead of silicone around the perimeter of the penetration. Apply the first coat of Sheltercoat Roof & Deck on the substrate and the flanged metal. Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.2mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant. For heavy foot traffic areas a reinforcing mat is required between coats.

COVERAGE
2 coat system (light traffic): 20m^2 per unit of 20kg liquid/2x10 kg powder at a dry film thickness of 1.5mm.
3 coat/mat system (heavy traffic): 13m^2 per unit of 20kg liquid/2x10 kg powder at a dry film thickness of 2.5mm
Coverage will vary depending on the condition of the surface and film thickness.

DRYING TIME
Allow 4 hours between coats (at 23°C and 50% RH) if a reinforcing material is not used. When using a reinforcing material it should be embedded in the wet membrane and immediately overcoated. The membrane is fully dry within 24 hours (at 23°C and 50% RH), after which it can be subjected to light foot traffic. Avoid full service foot traffic until the membrane is fully cured (7 days at 23°C, 50% RH).
Pot life is approximately 3 hrs at 23°C and 50% RH.
Drying time will vary depending on humidity, temperature and surface porosity.
Do not apply on substrates where the surface temperature is below 5°C or above 35°C.

6/4 March 2002

6

ARDEX

Shelter waterproofing membranes

Sheltercoat
External Liquid Membranes

SAFETY DATA

Sheltercoat Roof & Deck is non-toxic. However, the contents should not be swallowed or inhaled. In case of eye contamination, rinse thoroughly with clean water. If irritation continues seek medical advice.

PACKAGING/STORAGE

Product sold as two components: Part A 20kg bucket liquid, Part B 20kg bucket containing 2 x 10kg bags of powder.

CLEAN UP & DISPOSAL

Wash hands, brushes, rollers, etc. with water while the membrane is still fresh. remove cured material with mineral turpentine. Remove any food or drink stains immediately with warm water and a mild household detergent.
Dispose of containers in compliance with all relevant local, state, and federal regulations.

TECHNICAL PERFORMANCE DATA

Characteristics of liquid	
Form & Colour	Various coloured liquids
Specific Gravity:	Approx. 1.06 kg/litre
Characteristics of powder	
Form & Colour:	Off white powder
Bulk Density:	Approx. 1.4 kg/litre
Characteristics of mix	
Product Identity:	2 part, cementitious acrylic modified
Mixing Ratio:	1:1 by Weight (10 kg of Powder: 10 kg of Liquid)
Specific Gravity:	Approx. 1.3
Characteristics of cured membrane	
Water absorption:	AS A121 App K 5%
Tensile Strength: MPa	28 days dry AS1145 1.97
after UV exposure	2.32 MPa
Elongation at Break:	
28 days dry	AS1145 208%
after UV exposure	155%
Movement joint test	CSIROPass
Application Details	
Application method:	Short nap (5mm pile) roller or brush
Overcoat time:	4 hrs @ 23°C 50% RH
Pot life:	3 hrs @ 23°C 50% RH
Dry through (2nd coat):	Overnight @ 23°C 50% RH
Application temperature:	5°C-30°C (surface temp)
Service temperature:	0-80°C
Coverage:	Approx 20m² per 20kg liquid/ 2x10kg powder at 1.5mm DFT

NOTE: Most of the tests have been carried out in a Ardex laboratory under standard conditions (23±2°C, 50±5% R.H)

The information presented in this data sheet is intended to give a fair description of the products and their capabilities under specific test conditions. It does not constitute an offer by the manufacturer, nor does the manufacturer warrant or guarantee its accuracy of completeness in describing the performance or suitability of the various products.

6/5 March 2002

ARDEX

6

Appendix G. Dow Corning Blue Styrofoam

PRODUCT INFORMATION | United States | COMMERCIAL/ LOW TEMP

Building & Construction

1 PRODUCT NAME

STYROFOAM Square Edge Extruded Polystyrene Insulation

2 Manufacturer

The Dow Chemical Company
Dow Building & Construction
200 Larkin
Midland, MI 48674
1-866-583-BLUE (2583)
Fax 1-989-832-1465
www.dowstyrofoam.com/architect

3 Product Description

STYROFOAM* Square Edge insulation is an extruded polystyrene board that meets the needs of the commercial foundation and building floor slab market.

STYROFOAM extruded polystyrene has more than 50 years of proven performance in wet environments. The closed-cell structure of STYROFOAM Square Edge insulation resists water pickup, enabling it to retain a high R-value** over time – a necessary property in wet, below-grade commercial foundation applications.

BASIC USE

STYROFOAM Square Edge insulation protects foundation damp-proofing and waterproofing, especially during backfilling. It also provides a secondary barrier against groundwater leakage. With STYROFOAM Square Edge insulation, freeze-thaw cycling of the foundation wall is minimized, reducing the potential for cracking. And a warmer foundation can reduce the potential for condensation.

STYROFOAM Square Edge insulation can be used against commercial interior walls and exterior foundation walls in above- and below-grade applications. STYROFOAM Square Edge insulation can be used under the slab or over the deck or subfloor. STYROFOAM Square Edge insulation is suitable for use in pervious, semi-pervious and practically impervious soils.

SIZES

Width and length:
2' x 8' and 4' x 8'
Thickness:
.75", 1", 1.5", 2", 2.5", 3", 4"
Edge treatment: Square edge

Not all product sizes are available in all parts of the country. Contact your local Dow representative for details.

4 Technical Data

APPLICABLE STANDARDS

ASTM International

- ASTM C578, Type IV – Standard Specification for Rigid Cellular Polystyrene Thermal Insulation
- ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- ASTM C272 – Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
- ASTM D696 – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer
- ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials
- Meets IBC/IRC requirements for foam plastic insulation; see NES NER 699
- Factory Mutual Approved – Subject to conditions of approval as a roof insulation when installed as described in the current edition of the FM Approval Guide

PHYSICAL/CHEMICAL PROPERTIES

STYROFOAM Square Edge insulation exhibits physical properties as indicated in Table 1 when tested as represented.

For chemical resistance properties of STYROFOAM Square Edge insulation, see Table 2.

ENVIRONMENTAL DATA

STYROFOAM Square Edge insulation is manufactured with HCFC blowing agents, which have 94 percent less ozone depletion potential than standard CFC blowing agents.

STYROFOAM Square Edge insulation is reusable in many applications and can be recycled.

TABLE 1

Physical Properties of STYROFOAM Square Edge Insulation

Property and Test Method	Value
Thermal Resistance(1) per inch, ASTM C518 @ 75°F mean temp., ft²•h•°F/Btu, min., R-value	5.0
Compressive Strength(2), ASTM D1621, psi, min.	25
Water Absorption, ASTM C272, % by volume, max.	0.1
Water Vapor Permeance(3), ASTM E96, perm, max.	1.1
Maximum Use Temperature, °F	165
Coefficient of Linear Thermal Expansion, ASTM D696, in/in•°F	3.5×10^{-5}

(1) R-values are consistent with criteria of ASTM C578 and requirements of FTC R-value rule (16 CFR Part 460).
(2) Vertical compressive strength is measured at 10 percent deformation or at yield, whichever occurs first.
(3) Based on 1" thickness.

*Trademark of The Dow Chemical Company

**R means resistance to heat flow. The higher the R-value, the greater the insulating power.

STYROFOAM Square Edge Insulation

PRODUCT INFORMATION

TABLE 2

Chemical Resistance(1) of STYROFOAM Square Edge Insulation

Acid, inorganic, weak	Excellent
Acid, inorganic, strong	Excellent
Acid, organic, weak	Excellent
Acid, organic, strong	Good
Bases	Excellent
Alcohols, including isopropyl alcohol	Excellent
Methyl ethyl ketone	Not recommended
Polyglycols, including propylene glycol	Excellent
Hydrocarbons	Not recommended
Salts	Excellent
Insecticides	Not recommended
Kerosene	Poor
Mineral oil USP	Excellent
Naphtha (VMP)	Not recommended
Turpentine	Not recommended
Beer	Good
Gasoline	Not recommended
Fruit juices	Good

(1) Explanation of ratings:
Excellent = The plastic was unaffected for the duration of the test.
Good = A very slight clouding or discoloration of the plastic.
Poor = Considerable changes in plastic during exposure, possible etching, discoloration, dimensional or weight changes.
Not recommended = Severe attack of the plastic. Became soft and unusable after a few hours of exposure.

NOTE: This table should be used as a guide only. For design purposes, specific test data on the intended application may be needed.

FIRE PROTECTION

STYROFOAM Square Edge insulation is combustible; protect from high heat sources. Local building codes may require a protective or thermal barrier. For more information, consult MSDS, call Dow at 1-866-583-BLUE (2583) or contact your local building inspector.

5 Installation

STYROFOAM Square Edge insulation boards are easy to handle, cut and install. The square edge boards are designed to ensure energy efficiency and minimize on-site cutting and waste. Use a polystyrene-compatible adhesive to hold the boards in place during backfilling. Apply caulk or mastic to the top of the board to prevent water infiltration behind the insulation. To complete the installation, parge the above-grade portions of STYROFOAM Square Edge insulation to protect from solar radiation.

It is recommended that any masonry irregularities or jagged surfaces on the foundation wall or slab be removed prior to installation. Below-grade walls should be protected from moisture leakage and dampness prior to installation of STYROFOAM Square Edge insulation. Code-approved drainage systems should be installed. Ensure foundation drainage meets local codes.

Contact a local Dow representative or access the literature library at www.dowstyrofoam.com/architect for more specific instructions.

6 Availability

STYROFOAM Square Edge insulation is distributed through an extensive network. For more information, contact your local Dow representative or call 1-800-232-2436.

7 Warranty

Fifteen-year limited thermal warranty.

8 Maintenance

Not applicable.

9 Technical Services

Dow can provide technical information to help address questions when using STYROFOAM Square Edge extruded polystyrene insulation. Technical personnel are available at Dow sales offices to assist with any insulation project.

10 Filing Systems

- www.dowstyrofoam.com/architect
- www.sweets.com

IN THE U.S.:
• For Technical Information: **1-866-583-BLUE (2583)**
• For Sales Information: **1-800-232-2436**

THE DOW CHEMICAL COMPANY
• Building & Construction • 200 Larkin • Midland, MI 48674 • **www.dowstyrofoam.com/architect**

DOW
Living.
Improved daily.

Printed in U.S.A.

Form No. 179-04454-0404P&M
MdCAY182644-05/05

Appendix H. APP divisional moulding

Standard UPVC

Hardware Profiles

australian plastic profiles

A.C.N: 001 414 759 A.B.N. 77 001 414 759

DESIGNER AND MANUFACTURER
OF UPVC PROFILES FOR THE BUILDING INDUSTRY

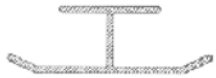
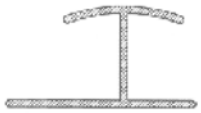
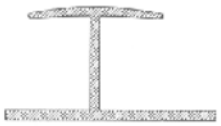
Head office: 12 Cawarra Road, Caringbah, NSW 2229 Australia
Telephone: 61 2 9527 8800 Facsimile: 61 2 9527 8811
www.app.net.au

Quality Endorsed Company

Newcastle Branch	Canberra Branch	Melbourne Branch	Brisbane Branch	Adelaide Branch	Perth Branch
40 Sandringham Ave	77Bayldon Rd	124-128 Malcolm Road	32 Clinker St	493 Cross Keys Road	14 Milly Court
Thornton NSW 2322	Queanbeyan NSW 2620	Braeside VIC 3195	Darra QLD 4076	Cavan SA 5094	Malaga WA 6090
Ph: (02) 4966 0844	Ph: (02) 6299 3611	Ph: (03) 9587 9600	Ph: (07) 3715 8811	Ph: (08) 8262 8711	Ph: (08) 9248 4315
Fax: (02) 4966 0855	Fax: (02) 6299 7935	Fax: (03) 9587 9700	Fax: (07) 3715 8822	Fax: (08) 8262 8722	Fax: (08) 9248 4316

JOINT PROFILES (continued)

* Size only available in S.A.

Product Drawn To Full Size	Part No - Description	Packs	Colour - Size
	**HM14** - FOR 9.5mm BOARD	25	White - 3.100m 9 322537 010637
	**HM7** - FOR 10mm BOARD	25	White - 2.400m 9 322537 010651 White - 2.700m 9 322537 010675 White - 3.000m 9 322537 010699 White - 3.600m 9 322537 010712
	**HM8** - FOR 13mm BOARD	25	White - 3.000m 9 322537 010750 White - 3.600m 9 322537 010774
	**HM16** - FOR 16mm BOARD	25	White - 3.000m 9 322537 010798

5

Appendix I. Schlage door lock

D SERIES LEVERS

Extra Heavy Duty Commercial

D-Series locks are for commercial, institutional and industrial use, such as schools, hospitals and factories, where a long life of dependable operation must be combined with a high degree of resistance to physical abuse.

Popular functions of all lever designs are also available in Vandlgard®, where levers are free-wheeling in the locked position to resist more forceful attacks.

Performance Features

Tested to exceed 3,000,000 cycles, greatly exceeding the 800,000 cycle ANSI Grade 1 requirement.

Exceeds ANSI A156.2 Series 4000 Grade 1 locked lever torque requirements.

Vandlgard® functions have free-wheeling levers to resist force when locked.

Independent heavy duty spring cages for effective lever support.

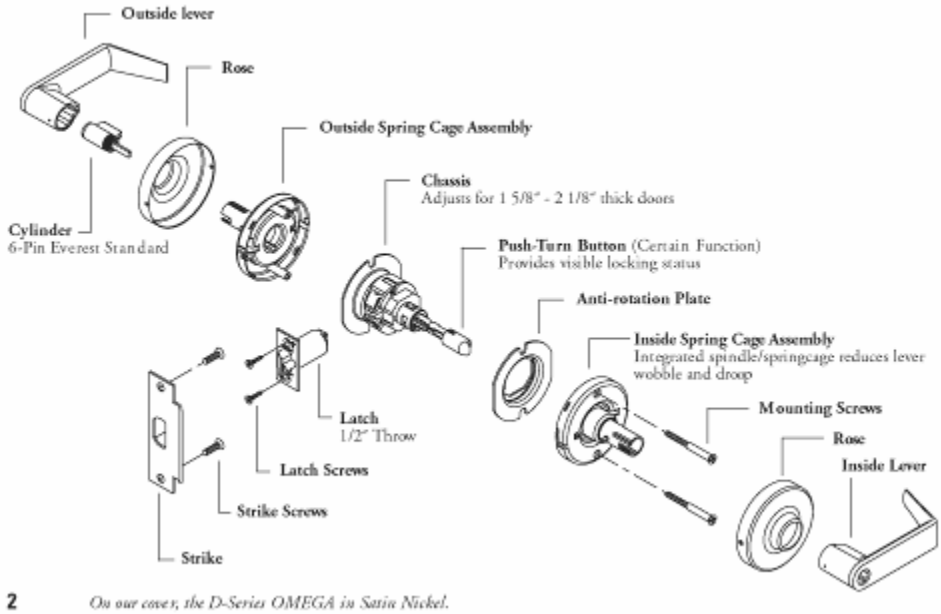
Thru-bolted mechanism for positive interlock to door.

Concealed mounting screws.

Steel Latchbolt.

INDEX

Exploded View



2 *On our cover, the D-Series OMEGA in Satin Nickel.*

Specifications

Handing:
All D-Series lever locksets are non-handed.

Door Thickness:
1⅜" to 2⅛" (41mm–54mm) standard including Vandlgard® functions.
See accessories (Page 12) for spacers required for 1⅜" doors.

Backset:
2¾" (70 mm) standard. 2⅜", 3¾" and 5" (60 mm, 95 mm, 127 mm) optional.

Faceplate:
Brass, bronze or stainless steel. 1⅛" x 2¼" (29 mm x 57mm) square corner, beveled.

Lock Chassis:
Zinc plated for corrosion resistance.

Latch Bolt:
Steel, ½" (12mm) throw, deadlocking on keyed and exterior functions. ¾" (19 mm) throw anti-friction latch available for pairs of fire doors.

Exposed Trim:
Levers: Pressure cast zinc, plated to match finish symbols.
Roses: Solid brass.

Strike:
ANSI curved lip strike 1¼" x 4⅞" x 1³⁄₁₆" lip to center standard. Optional strikes, lip lengths and ANSI strike box available. See page 11.

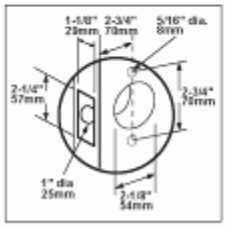
Cylinder & Keys:
6-pin Everest C123 keyway standard with two patented nickel silver keys per lock.

Keying Options:
Interchangeable core and Primus® high security cylinders. Master keying, grand master keying and construction keying.

Warranty:
Seven-year limited for all functions including Vandlgard®.

Door Preparation

Lever Designs



Certifications

ANSI
Meets or exceeds A156.2 Series 4000, Grade 1 strength and operational requirements. Meets A117.1 Accessibility Code.

Federal
Meets FF-H-106C Series 161.

California State Reference Code
(Formerly Title 19, California State Fire Marshal Standard)
All levers with returns comply; levers return to within ½" of door face.

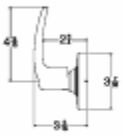
UL / cUL:
All locks listed for A label single doors, 4' x 8'.
Letter F and UL symbol on latch front indicate listing.
Electrified functions are UL19X Listed for single point locking applications.
UL437 Listed locking cylinder optional: specify Primus 20-500 Series cylinder.

3

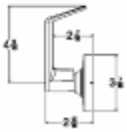
D SERIES LEVERS

Lever Designs & Finishes

ATHENS
Symbol: ATH
Material: Pressure cast zinc lever; wrought brass rose
Finishes:
605, 606, 612, 613, 619, 625, 626

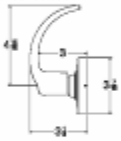


RHODES
Symbol: RHO (06)*
Material: Pressure cast zinc lever; wrought brass rose
Finishes:
605, 606, 612, 613, 619, 625, 626

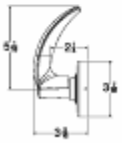


Lever Designs & Finishes

SPARTA
Symbol: SPA (17)*
Material: Pressure cast zinc lever; wrought brass rose
Finishes:
605, 606, 612, 613, 619, 625, 626



OMEGA
Symbol: OME*
Material: Pressure cast zinc lever; wrought brass rose
Finishes:
605, 606, 612, 613, 619, 625, 626



* Trim available with CM5200 Series Locksets


605
Bright Brass


606
Satin Brass


612
Satin Bronze

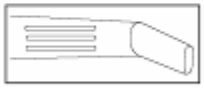

613
Oil Rubbed Bronze


619
Satin Nickel


625
Bright Chromium Plated


626
Satin Chromium Plated

8 Keyed functions available with interchangeable core options. Levers are available for full size and small format interchangeable cores.



TACTILE WARNING (KNURLING)
Change symbol designation as follows:
8AT for Athens*
8RO for Rhodes
8SP for Sparta

Only outside lever is knurled unless otherwise specified.

Not available with Omega trim

Finishes
605 Bright Brass
606 Satin Brass*
612 Satin Bronze
613 Oil Rubbed Bronze
619 Satin Nickel
625 Bright Chromium Plated
626 Satin Chromium Plated

4

D SERIES LEVERS

Functions

Non-Keyed Locks

SCHLAGE ANSI

ND10S F75 — **Passage Latch**
Both knobs always unlocked.

ND12D F89 — **Exit Lock**
Outside lever always fixed. Inside lever always unlocked.

ND12DEL — **Electrically Locked (Fail Safe)**
Outside lever continuously locked electrically. Unlocked by switch or power failure. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit.

ND12DEU — **Electrically Unlocked (Fail Secure)**
Outside lever continuously locked until unlocked by electric current. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit.

ND25D — **Exit Lock**
Blank plate outside. Inside lever always unlocked.

ND40S F76 — **Bath/Bedroom Privacy Lock**
Push-button locking. Can be opened from outside with small screwdriver. Turning inside lever or closing door releases button.

ND44S — **Hospital Privacy Lock**
Push-button locking. Unlocked from outside by turning emergency turn-button. Turning inside lever or closing door releases button.

ND170 — **Single Dummy Trim**
Dummy trim for one side of door. Used for door pull or as matching inactive trim.

Keyed Locks

SCHLAGE ANSI

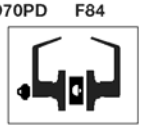
ND50PD F82 — **Entrance/Office Lock***
Push-button locking. Push-button locks outside lever until unlocked with key or by turning inside lever.

ND53PD F109 — **Entrance Lock***
Turn/push-button locking; pushing and turning button locks outside lever, requiring use of key until button is manually unlocked. Push-button locking; pushing button locks outside lever until unlocked by key or by turning inside lever.

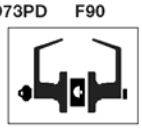
ND60PD F88 — **Vestibule/Classroom Security Lock***
Latch retracted by key from outside when outside lever is locked by key in inside lever. Inside lever is always unlocked.

ND66PD F91 — **Store Lock*†**
Key in either lever locks or unlocks both levers.

ND70PD F84 — **Classroom Lock***
Outside lever locked and unlocked by key. Inside lever always unlocked.



ND73PD F90 — **Corridor Lock***
Outside lever locked by key outside or push-button inside. Push-button released by rotating inside lever or closing door. When outside lever is locked by key, key must be used to unlock it. Inside lever is always unlocked.



* *Available functions for small format interchangeable core.*

† ***Caution:*** *Double cylinder locks on residences and any door in any structure which is used for egress are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.*

6

D SERIES LEVERS

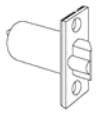
Latches

D-Series latches are adjustable for flat or beveled edge doors. Latches and strikes are furnished in brass, bronze, or chrome finishes to be compatible with lock trim. When ordering, specify quantity, part number, and finish. All D-Series latches have ½″ throw and 1″ housings except 2⅜″ backset latches, which include sleeve G506-815 to fill a 1″ edge bore.
Standard latches are shown in bold type.

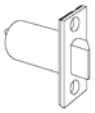
Latches

Backset	Description	Deadlatch ½″ Throw	Springlatch ½″ Throw
2⅜″ 60mm	1⅛″ (29mm) x 2¼″ (57mm) square corner	14-047	–
	1″ (25mm) x 2¼″ (57mm) square corner	14-048	–
2¾″ 70mm	**1⅛″ (29mm) x 2¼″ (57mm) square corner**	**13-047**	**13-048**
	1⅛″ (29mm) x 2¼″ (57mm), ¾″ (19mm) throw for pairs of fire doors	14-042	–
3¾″ 95mm	1⅛″ (29mm) x 2¼″ (57mm) Square corner	14-028	14-010

Deadlatch



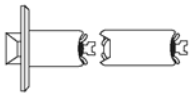
Springlatch



¾″ Throw Anti-Friction Deadlatch for Pairs of Fire Doors

Long Backsets
D-Series locks with 5″ backsets are normally furnished with 1⅛″ faceplates and 1″ housings. Links installed in metal doors require one A501-567 sleeve (order separately) to join latch and link.

Extension Link



Sleeve

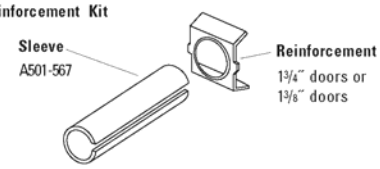
(add to 2¾″ backset latch)
A501-567

Latch Sleeve
Included with 2⅜″ backset latches to fill 1″ edge bores.

Door Reinforcement
Schlage 37-001 reinforcing kit is used to reinforce and help prevent the collapse of hollow metal doors when locksets are tightly mounted.

This kit should be used with long backsets for D-Series lock installations in hollow metal doors to prevent lateral movement of the latchbolt. Specify door thickness, 1⅜″ or 1¾″, when ordering reinforcement kits.

Reinforcement Kit



Strikes

All Schlage strikes are furnished complete with screws. The standard D-Series strike has a 1 3/16″ lip.
When ordering separately specify quantity, product number, finish, and lip length. Standard strikes are shown in bold type.

Strikes

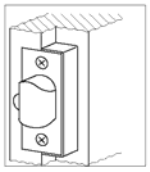
Number	Lip Length	Description
10-013	1 ⅛″ (28mm)	1 ⅛″ x 2 ¾″ (28mm x 70mm) Square corner, box 1 ¾″ (38mm)
10-016	1 ⅛″ (28mm)	1 ⅛″ x 2 ¾″ (28mm x 70mm), ¾″ (19mm) deep box for 14-042 fire door latch
10-025	**1 3/16″ (30mm) 1 ⅜″ (35mm)**	**1 ¼″ x 4 ⅞″ (32mm x 124mm) ANSI**
K510-066	—	Box for 10-025 ANSI strike

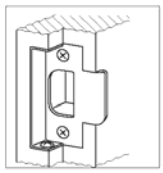
ANSI Strike–Standard
10-025
1 ¼″ x 4 ⅞″ x 3/32″

Square Corner Box Strike
10-013
1 ⅛″ x 2 ¾″ x 3/32″

Rabbeted Latch and Strike Kit
Rabbeted latch and strike kit finishes: 605, 626.
This kit adapts square corner latches and 2¾″ (28mm) high strikes for ½″ (13mm) rabbeted door and frame preparations.

Rabbeted Latch and Strike Kit
39-030





10

D SERIES LEVERS

How to Order D-Series Levers

To order Schlage® products, descriptive data should be in the same sequence as shown.

Line Item	Qty	Product	Outside		Inside		Hand	Latch	Strike	Door Thickness	Ext	Dim	Additional Details
			Des	Fin	Des	Fin							
1	2	3	4	5	6	7	8	9	10	11	12	13	14

1 Line item number
2 Quantity
3 Complete model number with function and cylinder type

To order cylinder options, change "PD" at the end of the model number as follows:

ND53PD Standard.

ND53LD Less standard cylinder. For Primus® cylinder, specify this option and order Primus cylinder separately.

ND53CD With temporary plastic construction cylinder. Double cylinder functions ordered *less cylinder* are furnished with these construction cylinders to maintain timing of key cams.

ND53JD Prepared for full size interchangeable core, less core. For Primus core, specify this option and order Primus core separately.

ND53RD With full size conventional interchangeable core installed. Order control keys separately.

ND53TD With full size (temporary) construction core installed. Order all keys separately.

ND53BD Prepared for small format (Falcon®, Best®, etc.) interchangeable core (SFIC), less core.

ND53GD With Everest® B Family restricted keyway small format core installed. Order control keys separately.

ND53HD With small format keyed brass construction core installed. Order all keys separately.

ND53BDC With small format disposable plastic construction core installed.

4/5 Outside design / finish. Specify tactile warning (knurling) here as "8AT" for Athens®, "8RO" for Rhodes® or "8SP"for Sparta®.
6/7 Inside design / finish. Leave blank if same as outside.
8 Hand. Required for keyed knob designs and all split finish locksets. One hand per line item.
9 Latch. Leave blank for standard or specify part number for optional latch. LLL=Less Latch.
10 Strike. Leave blank for standard or specify part number for optional strike. LLL=Less Strike.
11 Door thickness, if non-standard. Example: 200 = 2″.
12 Extension, to specify whether thick door is extended inside (EI), outside (EO), differently (ED) or equally (EE).
13 Dimension for strike lip lengths. See strike page for availability of specific dimensions with specific strikes.
100 = 1″
118 = 1⅛″
114 = 1¼″
138 = 1⅜″
112 = 1½″
134 = 1¾″
200 = 2″
14 Keying detail (e.g. key symbol, keyway, bitting) and other special requirements.

EXAMPLE

Line Item	Qty	Product	Outside		Inside		Hand	Latch	Strike	Door Thickness	Ext	Dim	Additional Details
			Des	Fin	Des	Fin							
1	24	ND10S	SPA	605					10-013	214	EE		
2	4	ND50RD	RHO	613								138	C145 245793
3	60	ND93PD	ATH	626				14-047					E 000000

Note: Schlage order forms are available at no charge at www.schlage.com/pricing/pricing.htm.

12

Administrative Offices
111 Congressional Blvd.,
Suite 200
Carmel, IN 46032
(800) 847-1864
FAX (800) 452-0663

Commercial Customer Service
2315 Briargate Parkway, Suite 700
Colorado Springs, CO 80920
(800) 847-1864
FAX (800) 452-0663
Order Entry
FAX (800) 452-0665

Canada and Latin America
Ingersoll-Rand Architectural Hardware
1076 Lakeshore Road East
Mississauga, Ontario, L5E 1E4, Canada
(905) 403-1800
FAX (905) 278-1413

North-East Asia
23/F, 625 Kings Road
Northpoint
Hong Kong
(852) 2235-0600
FAX (852) 2565-1409

Internet
http://www.schlage.com

Fax-On-Demand
(888) 321-3228

Southeast Asia / Australia / NZ
IR Architectural Hardware Ltd.
P.O. Box 19-347
437 Rosebank Road,
Avondale, Auckland, New Zealand
+64 (0) 9-829-0550
FAX +64 (0) 9-829-0552

Mexico
IR Security and Safety
Blvd. Centro Industrial No. 11
Puentas de Vigag, Tlalnepantla
Estado de Mexico, 54070 Mexico
+525-5-8583-6614

United Kingdom
IR Security and Safety Ltd.
Bescot Crescent
Walsall, West Midlands WS1 4DL
United Kingdom
+44 (0)1922 707400
FAX +44 (0)1922 646303

Security & Safety
Proven Source. Proven Solutions.™

Schlage
111 Congressional Blvd., Suite 200
Carmel, IN 46032
800-847-1864
800-452-0663 Fax
www.schlage.com

An Ingersoll Rand business

Appendix J. Brevetti–Stendalto cable-chains

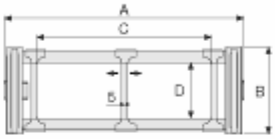
Serie Heavy

SR308B

Nylon Cable Chain with un-screwable aluminium rods

Inner height (D) 48 mm

Strong double share Sideband & Frame construction with large anti-friction triple-pin. Alu-rod frames are un-screwable from inner and outer radius. As standard the chain comes with frames every second link, on request with frames every link. Vertical and horizontal separator systems are available.



Separator	
- Unassembled	Part.no S3000F
- Assembled	Part.no S3000FMC
Pin	
	Part.no PG308

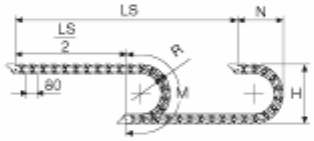
Technical characteristics when self-supported

Speed	8 m/s
Acceleration	40 m/s²

For higher requirements please consult our technical dept.

A	B	C	D	R	Weight/m	Chain
mm	mm	mm	mm	mm	kg	Part Number
156	75	100	48	150-180-200-230-280-400	2,85	SR308B100 □*
206	75	150	48	150-180-200-230-280-400	3,00	SR308B150 □*
256	75	200	48	150-180-200-230-280-400	3,15	SR308B200 □*
306	75	250	48	150-180-200-230-280-400	3,30	SR308B250 □*
356	75	300	48	150-180-200-230-280-400	3,45	SR308B300 □*
C+56	75	.....	48	150-180-200-230-280-400		SR308B□□□ □**

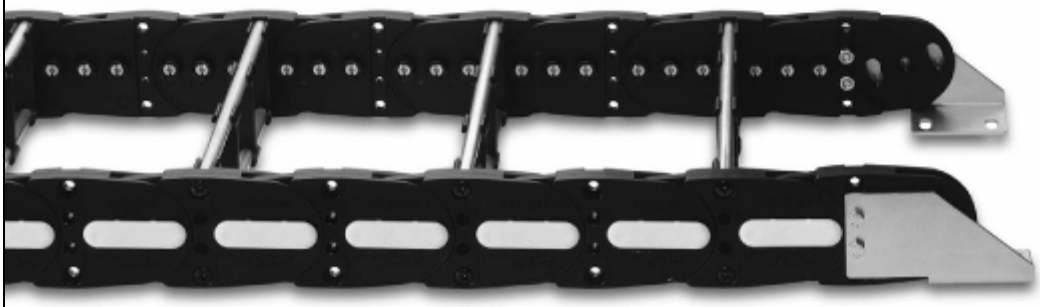
**Complete the code by inserting the value of the radius (R): Ex. SR308B200 1*
Where: 1=150; 2=180; 3=200; 4=230; 5=280; 6=400
***Complete the code by inserting the value of the quote C and the radius (R): Ex. SR308B 1215 1*
Chain equipped with aluminium rods every pitch: complete the code by inserting the letter D.
Ex. SR308B2001 D



R	H	N	M
mm	mm	mm	mm
150	375	270	635
180	435	300	725
200	475	320	790
230	535	350	885
280	635	400	1040
400	875	520	1420

Length of chain (L)
Half travel distance $(\frac{LS}{2})$
plus length of curve (M)

$$L = \frac{LS}{2} + M$$



98

Version with Alu-rods on every second pitch.

brevetti stendalto

Serie Heavy

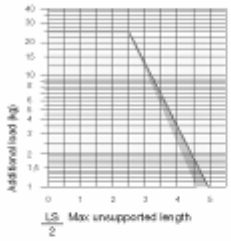
SR308B

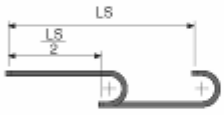
Nylon Cable Chain with un-screwable aluminium rods

3

Self-Supporting Capacity Diagram

The maximum length of the self-supporting capacity ($\frac{LS}{2}$) in relationship to the weight of the cables and hoses contained per linear metre.





The red marking in the diagram area considers the difference of weight between various widths of chains assembled with rods every second pitch.

For applications with $\frac{LS}{2}$ and weights not included in the area of the diagram showing self-supporting capacity, verify the possible use of support rollers (see page 30).

End Brackets

The end brackets set allows the two ends of the chain to be attached to the equipment.

Nylon Type

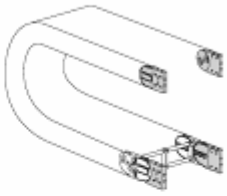
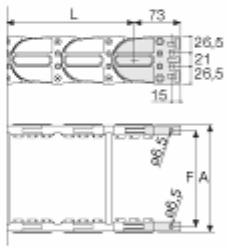


Fig. A
The chain can be fixed frontally, inner or outer radius. (Fig A)



Chain Type	F mm
SR308B100	135
SR308B150	185
SR308B200	235
SR308B250	285
SR308B300	335

Special dimension F=A-21

Bright Zinc Plated Steel Type*

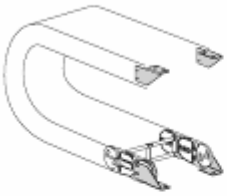
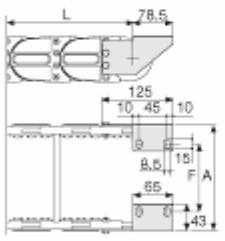


Fig. B
Chain fixed outside the radius. (Fig B)
See end brackets mounting variations page 31.



Chain Type	F mm
SR308B100	93
SR308B150	143
SR308B200	193
SR308B250	243
SR308B300	293

Special dimension F=A-63

Nylon Type Part Numbers

Complete Set Assembled

Chain Type	End Brackets Set
SR308B...	AN308KM

Complete Set Unassembled

Chain Type	End Brackets Set
SR308B...	AN308K

Bright Zinc Plated Steel Type Part Numbers

Complete Set Assembled

Chain Type	End Brackets Set
SR308B...	A308KM □**

Complete Set Unassembled

Chain Type	End Brackets Set
SR308B...	A308K □**

**Available on request in stainless steel*
*** 1=Pos.1; 2=Pos.2; 3=Pos.3*
See end brackets mounting variations page 31.

Steel laminar cover.

Supplementary movable separators.

Special tool to remove the connecting pivots: Part Number PZ038.

For further information please consult Brevetti Stendalto's Technical Office

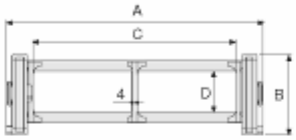
Serie Sliding

SR326B

Nylon Sliding Cable Chain with un-screwable aluminium rods

Inner height (D) 30 mm

Strong double share Sideband & Frame construction with large anti-friction triple-pin. The chain incorporates large sliding-skid surfaces to offer durability, even with high speed/loads. The Alu-rod frames are un-screwable from inner and outer radius. As standard the chain comes with frames every second link, on request with frames every link. Separator systems are available.



Separator	
- Unassembled	Part.no S2000F
- Assembled	Part.no S2000FMC
Pin	
	Part.no PG307

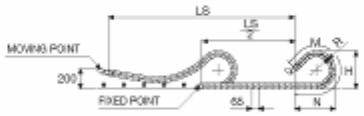
Technical characteristics

Speed	2 m/s
Acceleration	4 m/s²

For higher requirements please consult our technical dept.

A	B	C	D	R	Weight/m	Chain
mm	mm	mm	mm	mm	kg	Part Number
115	59	75	30	107-150-200-250-300	1,75	SR326B075□□□*
140	59	100	30	107-150-200-250-300	1,80	SR326B100□□□*
190	59	150	30	107-150-200-250-300	1,90	SR326B150□□□*
240	59	200	30	107-150-200-250-300	2,05	SR326B200□□□*
290	59	250	30	107-150-200-250-300	2,15	SR326B250□□□*
340	59	300	30	107-150-200-250-300	2,25	SR326B300□□□*
C+40	59	.....	30	107-150-200-250-300		SR326B □□□□□□**

**Complete the code by inserting the value of the radius (R): Ex. SR326B100 □□□*
***Complete the code by inserting the value of the quote C and the radius (R): Ex. SR326B□□□□□□*
Chain equipped with aluminium rods every pitch: complete the code by inserting the letter D.
Ex. SR326B100150 □



R	H	N	M
mm	mm	mm	mm
107	273	290	650
150	359	440	1025
200	459	610	1460
250	559	785	1900
300	659	960	2340

Length of chain (L)
Half travel distance $(\frac{LS}{2})$
plus length of curve (M)

$$L = \frac{LS}{2} + M$$

Version with Alu-rods on every second pitch.

126

brevetti stendalto

Serie Sliding

SR326B

Nylon Sliding Cable Chain with un-screwable aluminium rods

3

End Brackets

The end brackets set allows the two ends of the chain to be attached to the equipment. One set comprises two movable end brackets to install at the moving point and two standard steel end brackets to install at the fixed point.

Bright Zinc Plated Steel Movable Type* (moving point)

Bright Zinc Plated Steel Type* (fixed point)

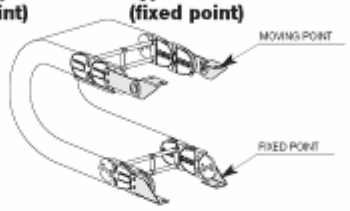
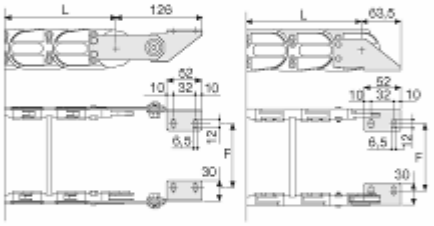


Fig. A
Chain fixed outside the radius. (Fig A)



Chain Type	F mm
SR326B075	67
SR326B100	92
SR326B150	142
SR326B200	192
SR326B250	242
SR326B300	292

Special dimension F=A-48

Bright Zinc Plated Steel Type Part Numbers

Complete Set Assembled

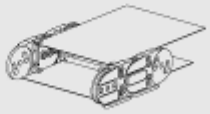
Chain Type	End Brackets Set
SR326B...	**A326KM**

Complete Set Unassembled

Chain Type	End Brackets Set
SR326B...	**A326K**

** Available on request in stainless steel*

Supplementary movable separators.



Steel laminar cover.

Special tool to remove the connecting pivots: Part Number PZ036.

For further information please consult Brevetti Stendalto's Technical Office

127

Appendix K. Baldor electric motors and controllers

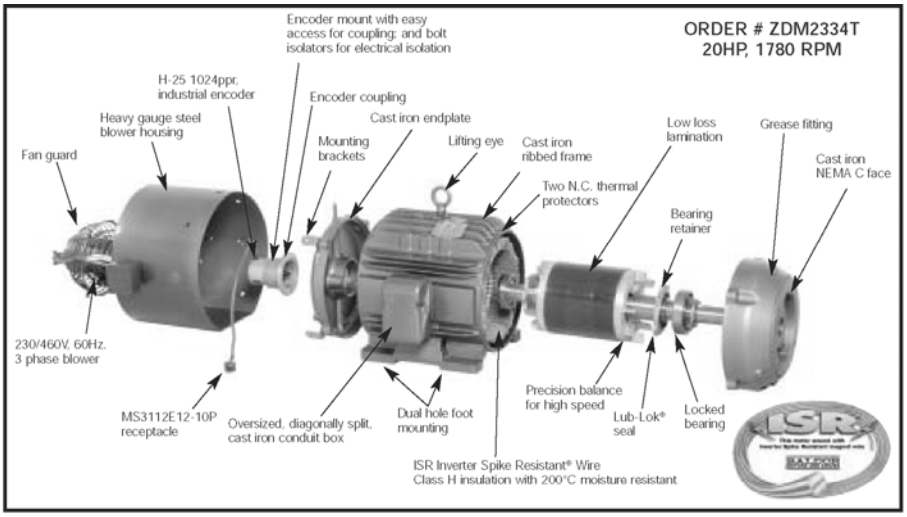
BALDOR MOTION PRODUCTS

Overview
Software
Motion Controls
AC Controls
AC Motors
DC Controls
DC Motors
Linear Motors
Linear Stages
Engineering Information

Baldor Vector Drive® Motors are proven in today's tough adjustable speed applications.

Baldor Adjustable Speed Drive Motors are proven in many tough applications found in today's industrial environment. Premium efficiency designs increase energy savings, lower temperature rise, and increase motor life. Baldor's integral horsepower motor designs feature cast iron construction for extra durability. The use of Baldor's Inverter Spike Resistant® Magnet Wire, Class H insulation with Class F (or lower) temperature rise, increases motor life. Totally Enclosed Non-Ventilated (TENV) and Totally Enclosed Blower Cooled (TEBC) motors are designed and tested for use on adjustable speed controls to ensure maximum performance and adequate cooling over the motor's entire speed range. Baldor Inverter Drive® and Vector Drive® motors meet NEMA MG1-1993, Part 31 requirements.

Baldor also offers a wide range of Explosion-Proof Inverter Drive® Motors, approved for use in hazardous locations with Baldor Series 15H Inverters.



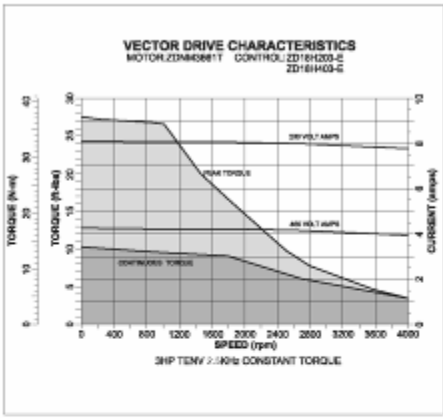
E-70

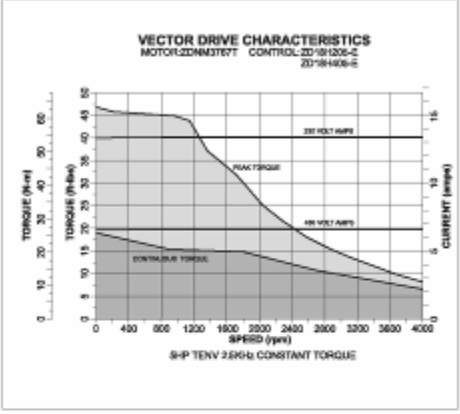
NOTE: This motor must be wound specifically for 240 V 3-phase power.

BALDOR MOTION PRODUCTS

Overview | Software | Motion Controls | AC Controls | AC Motors | DC Controls | DC Motors | Linear Motors | Linear Stages | Engineering Information

60 Hz Vector Performance Curves





Order Number			ZDNM3661T	ZDNM3767T
General				
Continuous Stall Torque		lb-ft	10.3	19
		Nm	14.0	25.8
Cont. Current	230 Volt	amps	8.1	13.4
	460 Volt		4.1	6.7
Peak Torque		lb-ft	27.5	47
		Nm	37.3	63.7
Peak Current	230 Volt	amps	16.2	26.8
	460 Volt		8.2	13.2
Mechanical				
Inertia		lb-ft^2	0.319	0.734
		lb-ft-sec^2	0.00991	0.02281
		kg-m^2	0.0134	0.0309
Max Speed		RPM	6000	6000
Number of Motor Poles			4	4
Enclosure			TENV NEMA 184TC	TENV NEMA 213TC
Encoder Line Count		PPR	1024	1024
Weight		lbs	108	166
		Kg	47.4	72.8

E-74

NOTE: This motor must be wound specifically for 240 V 3-phase power.

BALDOR MOTION PRODUCTS

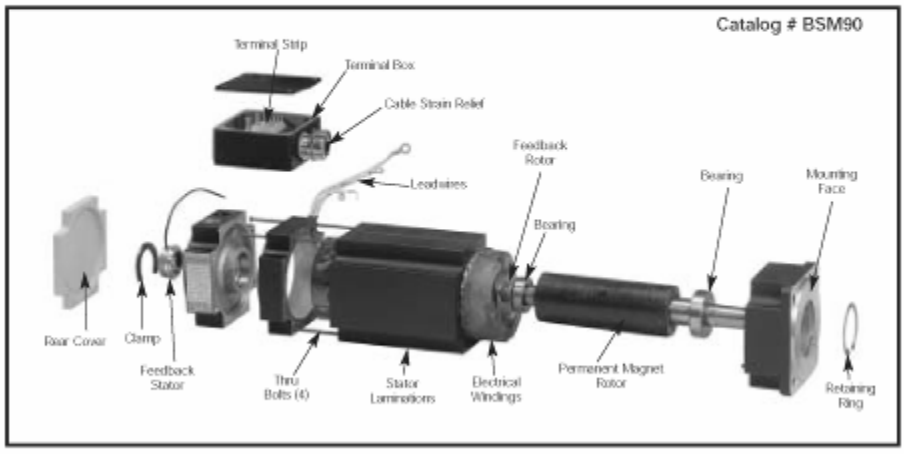
Overview | Software | Motion Controls | AC Controls | AC Motors | DC Controls | DC Motors | Linear Motors | Linear Stages | Engineering Information

Baldor's Brushless Servo Motors provide high torque to inertia for rapid positioning capability.

Product Characteristics Overview

	N-Series	A-Series	B-Series	WBSM-Series①
Magnetics	Neodymium Iron - Boron	Samarium Cobalt	Ferrite	Ferrite
Torque/Size	Highest	Same as N-Series	Normal	Normal
Inertia	Lowest	Same as N-Series	4-10 Times Higher (For Inertia Matching of Heavier Loads)	Same as B-Series
Peak Torque (Capability)	Highest (4X Continuous)	Same as N-Series	Typical (3X Continuous)	Same as B-Series
Acceleration Rate (Performance)	Most Responsive (400%)	Same as N-Series	Normal Response (100%)	Same as B-Series
Temperature (Coefficient)	Very Stable (.90)	Most Stable (.95)	Normal (.85)	Normal (.85)
Choose This Motor If Application Needs Call For ...	Best Price and Performance For Most Applications	Low Inertia and High Peak Torques	Normal Acceleration and Lowest Cost and High Inertia Loads	Washdown Duty Applications

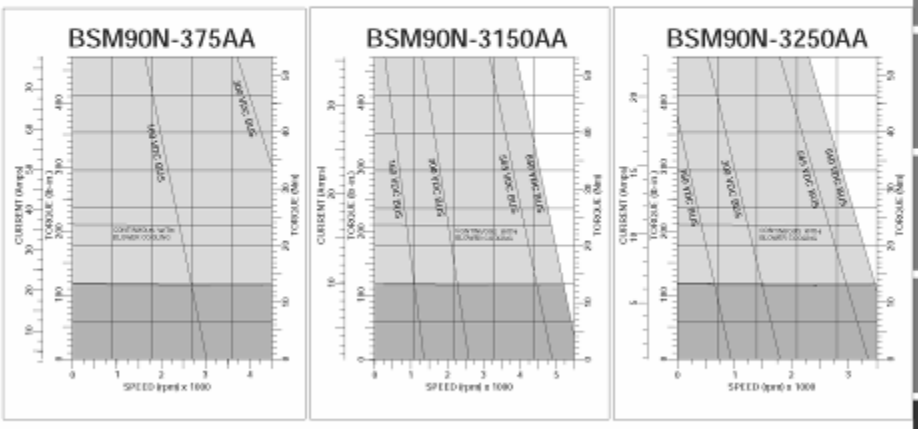
① WBSM can be provided in other motor series as a custom.



E-2

BALDOR MOTION PRODUCTS

BSM N-Series Performance Curves



Catalog Number		BSM90N-375AA	BSM90N-3150AA	BSM90N-3250AA
General				
Continuous Stall Torque	lb-in	117	117	117
	N-m	13.3	13.3	13.3
Continuous Current	amps	19.6	8.92	5.77
Peak Torque	lb-in	471	471	471
	N-m	53.2	53.2	53.2
Peak Current	amps	70.73	32.14	20.79
Mechanical Time Constant	msec	0.4	0.4	0.4
Electrical Time Constant	msec	5.0	5.4	5.5
Rated Speed	rpm	4000	2000	1200
Rated Voltage	volts	300	300	300
Electrical				
Torque Constant	lb-in/amp	6.05	13.31	20.58
	N-m/amp	0.684	1.505	2.326
Voltage Constant	V_{pk}/krpm	58.45	264.41	198.87
	V_{rms}/krpm	41.34	90.97	140.65
Resistance	ohms	0.2075	1.02	2.39
Inductance	mH	1.257	5.53	13.18
Mechanical				
Inertia	lb-in-s^2	0.0082	0.0082	0.0082
	Kg-cm^2	9.264	9.264	9.264
Maximum Speed	rpm	6000	5800	4000
Number of Motor Poles		8	8	8
Resolver Speed		1	1	1
Weight	lbs/Kg	38/17.3	38/17.3	38/17.3

NOTE: A blower cooling option is available which will increase the motor's continuous stall torque by another 80%. Peak torque remains unchanged.

Note: Performance of BSM90N-3150BA is the same as that of BSM90N-3150AA. The second B refers to the motor having a brake fitted.

c UL us

BALDOR MOTION PRODUCTS

H-Series Control

18H Series Vector and 23H Series Servo

The H Series is a fully protected control and uses the industry standard ± 10 VDC input command. And it is easy to use via the simple English command keypad. The 12 keys provide a tactile feel, and the display (32 character alphanumeric) provides full parameter names to simplify setup and operation. This series uses an auto-tuning method which makes it a breeze to configure the control and motor combination. Optional expansion boards extend product capability for application needs.

Ideally suited to operate
Brushless Motors with resolvers – BSM Series,
Vector Motors with encoders

Design Specifications
- Direct 230/400/460 3ϕ
- NEMA 4X Keypad when mounted on panel
- Encoder Feedback on 18H
- Resolver Feedback on 23H
- Simulated Encoder Output
- Internal PID Loop for Process Control
- NEMA 1 Enclosure
- Washdown Models Available

Velocity
- Standard ±10VDC
- Velocity/Current Mode
- Process Follower ± 5VDC, 4-20 ma (uni-direction only)
- 15 Preset Speed/Positions
- Setup via Auto-Tuning

Available Options
- High Speed Serial Communication RS232/485
- Master Pulse Reference (Pulse, Direction and Pulse Follower)
- High Resolution Analog Input
- 4 Output Relay/3-15 PSI Pneumatic Interface
- DC Tach Interface
- Isolated Encoder Feedback

Protection Features
- Motor Overspeed
- Adjustable Current Limit
- Isolated Control Circuitry
- Digital Display for Fault Conditions
- Selectable Automatic Restart at Momentary Power Loss
- Over/Under Voltage
- Line to Line and Line to Ground
- Motor Overload
- Linear Heatsink Thermal Sensor

Special Functions
- Process Control Mode
- Keypad Operation Mode
- Two Wire control with 15 Preset Speeds
- Linear or S-curve

Input Voltage		230 VAC			400 / 460 VAC 3ϕ		
Bus Voltage		300 VDC			565 / 650 VDC		
Output Current Amps (rms)③		Vector Control	Servo Control	Package	Vector Control	Servo Control	Package
Cont.	Peak	Catalog Number	Catalog Number	Size	Catalog Number	Catalog Number	Size
2.5	5	ZD25M2A02-TR⑥	SD26M2A02-TR⑥	A1	–	–	–
5	10	ZD25M2A05-TR⑥	SD26M2A05-TR⑥	AC	–	–	–
7.5	15	ZD25M2A07-TR⑥	SD26M2A07-TR⑥	AC	–	–	–
2	4	–	–	–	ZD18H402-E	SD23H4A02-E ①	A
3	6	–	SD23H2A03-E ①	A	–	–	A
4	8	ZD18H202-E	SD23H2A04-E ①	A	ZD18H403-E	SD23H4A04-E ①	A
5	10	–	–	–	ZD18H405-E	SD23H4A05-E ①	A
7	14	ZD18H203-E	SD23H2A07-E ①	A	–	–	–
8	16	–	–	–	ZD18H407-E	SD23H4A08-E ①	A
10	20	ZD18H205-E	SD23H2A10-E ①	A	–	–	–
11	22	–	–	–	ZD18H410-E	SD23H4A11-E ①	B
15	30	–	–	–	ZD18H415-E	SD23H4A15-E	B
16	32	ZD18H207-E	SD23H2A16-E	B	–	–	–
21	42	–	–	–	ZD18H420-EO	SD23H4A21-ER	C2
22	44	ZD18H210-E	SD23H2A22-E	B	–	–	–
27	46	–	–	–	–	SD23H4A27-ER	C2
28	56	ZD18H215-E	SD23H2A28-E	B	–	–	–
42	92	ZD18H220-EO	SD23H2A42-ER	C2	–	–	–
54	92	ZD18H225-EO	SD23H2A54-ER	C2	ZD18H450-EO	–	D

NOTE: ① For Washdown version, replace "E" with "W". Washdown models have NEMA 4X Indoor Enclosure as standard.
2) Order Regen Resistor & Motor Cables separately.
③ Current specified at 8 KHz PWM frequency. Units may be operated at 2.5 KHz to obtain higher output current.
4) Single phase input is possible with de-rate.
5) CE available as custom.
⑥ Available in 115 VAC 1ϕ

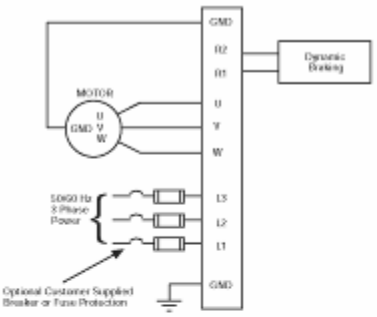
BALDOR MOTION PRODUCTS

Overview | Software | Motion Controls | AC Controls | AC Motors | DC Controls | DC Motors | Linear Motors | Linear Stages | Engineering Information

H-Series Technical Data

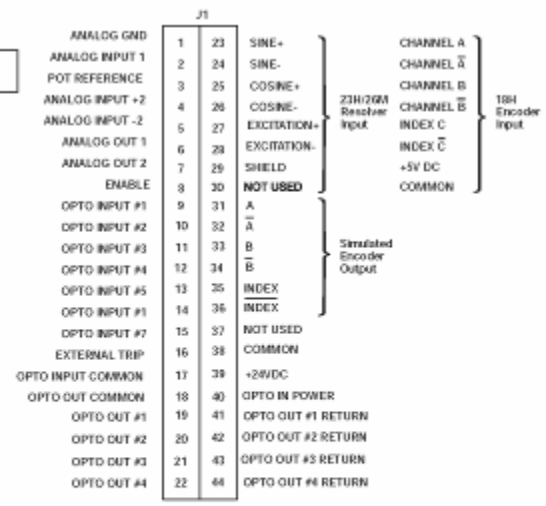
Description		Unit	Specifications
Input Voltage Range	115	VAC	97-125 1ϕ
	230	VAC	220-250 1ϕ
	230	VAC	180-264 @ 60 Hz; 180-230 @ 50 Hz, 3ϕ
	400/460	VAC	340-528 @ 60 Hz; 340-457 @ 50 Hz, 3ϕ
			Single phase operation of 3ϕ units possible with derate
Input Frequency		Hz	50/60
Efficiency		%	92-95%
Minimum Load Inductance		µH	100
Command Input		VDC	±10, ±5
Signal Resolution		bits	9 + sign
Velocity Feedback Resolution		bits	12
Simulated Encoder Output		ppr	1024 Differential Line Driver
Optional Pulse and Direction Input		–	5-15 VDC isolated (Max 500 kHz)
Optional Handwheel Input		–	Encoder (A and B) Max 500 kHz
Operating Altitude		Feet	3300 (Above derate 2% per 1000 ft.)
		Meters	1000 (Above derate 2% per 300 m)
Operating Temperature		°C	-10 to +40
Storage Temperature		°C	-30 to +65
Humidity		%	10 to 90 non-condensating
Shock		G	1 G
Vibration		G	1/2 G 10-60 Hz

Typical Connections



Typical Power Wiring

Typical connections shown for 18/23H

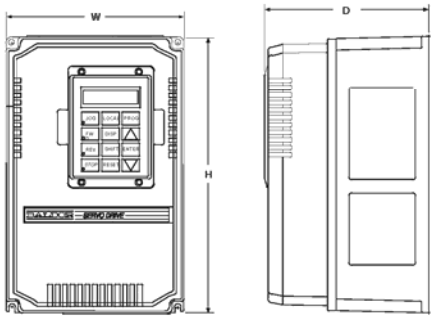


Typical Signal Wiring

D-16

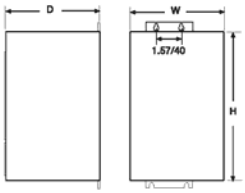
BALDOR MOTION PRODUCTS

Dimensions (inches/millimeters)



Package Size	Dimensions in (mm)			Weight lbs (Kg)
	H	W	D	
A	12 (312)	7.9 (203)	7.1 (181)	20 (9)
B	15 (391)	10 (254)	7.1 (180)	30 (13.7)
C2	16.98 (431)	10.5 (267)	9.66 (245)	60 (27.2)
D	25 (635)	14.5 (368.5)	10 (250)	90 (39.5)
A1	6.8 (173)	3.3 (84)	6 (152)	4.8 (2.2)
AC	6.8 (173)	4.3 (109)	6 (152)	4.8 (2.2)

Dimension for package size "A1" and "AC".



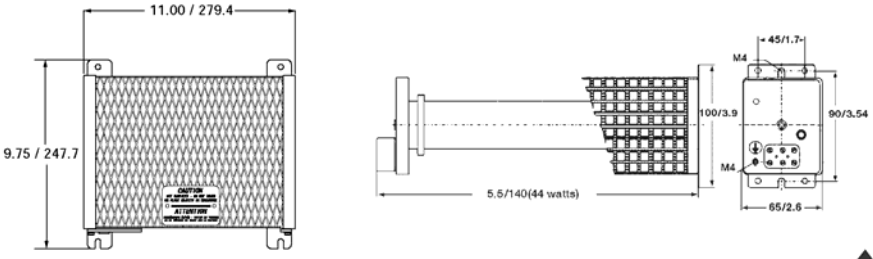
Regen Resistors

Regen resistors (RGA) assemblies are completely assembled and enclosed in a NEMA 1 enclosure. For the specific control, select the resistor with adequate continuous wattage capacity to meet the application requirements.

230 VAC Drive				400/460 VAC Drive			
Vector Control Catalog Number	Servo Control Catalog Number	Regen Resistor Catalog Number		Vector Control Catalog Number	Servo Control Catalog Number	Regen Resistor Catalog Number	
		600 Watts	1200 Watts			600 Watts	1200 Watts
ZD25M2AXX-TR	SD26M2AXX-TR	RG56①	–	–	–	–	–
ZD18H201-E	SD23H2A03-E	RGA630	RGA1230	ZD18H402-E	SD23H4A02-E	RGA6120	RGA12120
ZD18H202-E	SD23H2A04-E	RGA630	RGA1230	ZD18H403-E	SD23H4A04-E	RGA6120	RGA12120
ZD18H203-E	SD23H2A07-E	RGA620	RGA1220	ZD18H405-E	SD23H4A05-E	RGA660	RGA1260
ZD18H205-E	SD23H2A10-E	RGA620	RGA1220	ZD18H407-E	SD23H4A08-E	RGA660	RGA1260
ZD18H207-E	SD23H2A16-E	–	RGA1210	ZD18H410-E	SD23H4A11-E	RGA630	RGA1230
ZD18H210-E	SD23H2A22-E	–	RGA1210	ZD18H415-E	SD23H4A14-ER	RGA620	RGA1220
ZD18H215-E	SD23H2A28-E	–	RGA1206	ZD18H420-EO	SD23H4A21-ER	–	RGA1220
ZD18H220-ER	SD23H2A42-E	–	RGA1206	ZD18H430-EO	SD23H4A27-ER	–	RGA1220
ZD18H225-ER	SD23H2A55-ER	–	RGA1204	ZD18H440-EO	–	–	RGA1220
–	–	–	–	ZD18H450-EO	–	–	RGA1210

NOTE: H-Series with suffix -E have internal regeneration capability for 6 seconds of a 20% duty cycle braking.
① RG56 is 44 watt regen resistor.

RGA Regen Resistor Dimensions (inches/millimeters)



Overview | Software | Motion Controls | AC Controls | AC Motors | DC Controls | DC Motors | Linear Motors | Linear Stages | Engineering Information

D-17

BALDOR MOTION PRODUCTS

FlexDrive^{II}

The FlexDrive^{II} series is a "flexible" versatile drive. It is flexible, so you can tailor it to your application... it is flexible to accept the standard ±10 VDC input, or pulse and direction input, or electronic handwheel input... it is flexible so you can get it configured with various bus options (such as CAN, DeviceNet and Profibus), or with external +24 VDC to maintain logic power... flexible so you can configure it manually or via autotuning.

Ideally suited to operate
Brushless Motors – BSM Series
Linear Brushless – LMCF and LMBL Series

Design Specifications
- Control Brushless or Linear Motors
- Direct 115/230 1ϕ
- Direct 230-400/460 3ϕ
- Standard Resolver Feedback
- Simulated Encoder Output
- Setup via Software

Velocity
- Standard ± 10 VDC
- Velocity/Current Mode of Operation
- +5 VDC & +24 VDC Pulse and Direction Input
- Electronic Handwheel (Pulse Follower) Input
- Setup via Auto-Tuning

Special Features
- Customer selectable RS232/RS485
- 8 Digital Inputs
- 3 Digital Outputs
- 7 Segment Diagnostic Display
- Auto-Tuning

Available Options
- CAN-Bus, DeviceNet, Profibus-DP
- Encoder Feedback
- Absolute Encoder Feedback
- External Customer Supplied 24VDC Logic Supply

Protection Features
- Overvoltage
- Short Circuit Proof
- Over Temperature
- Over Current
- Resolver Fault
- Under Voltage
- Motor Pt
- Electronic Fusing
- Drive Overload
- Loss of Feedback
- Electronic Fusing
- Over Current Protection on Digital Outputs

FlexDrive^{II} Catalog Numbers

AC Input Voltage / Bus Voltage		115 VAC 1ϕ ② 160 VDC	230 VAC 1ϕ ② 300 VDC			400/460 VAC 3ϕ ②⑥ 565/650 VDC		
Output Amps ⑤ Cont.	Peak	Catalog Number	Catalog Number	Pkg. Size	Pkg.⑤ Size	Catalog ④ Number	Pkg. Size	Pkg.⑤ Size
2.5	5	FDH1A02TB-RN20 ③	FDH2A02TB-RN20 ③	A	B	FDH4A02TB-RN23 ③	G	G
5	10	FDH1A05TB-RN20 ③	FDH2A05TB-RN20 ③	C	D	FDH4A05TB-RN23 ③	G	G
7.5	15	FDH1A07TR-RN20	FDH2A07TR-RN20	D	D	FDH4A07TR-RN23	G	G
15	30	–	–	–	–	FDH4A15TR-RN23	H	H
20	40	–	–	–	–	FDH4A20TR-RN23	H	H
27.5	55	–	–	–	–	FDH4A27TR-RN23	H	H

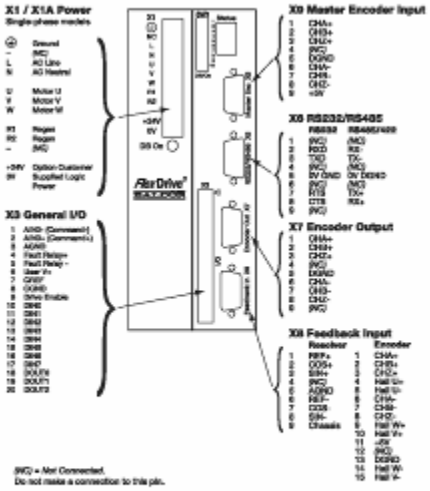
NOTE: ⑤ RMS Current.
② 24V required for operation of I/Os (customer supplied).
③ 2.5 amp models have internal 20W 175 ohm (115/230 VAC) or 300W 200 ohm (400/460 VAC) regen resistor.
5 amp models have internal 40W 90 ohm (115/230 VAC) or 300W 200 ohm (400/460 VAC) regen resistor.
④ Logic supply code = 3. Customer must supply +24 VDC for logic supply.
⑤ Package Size with Bus Option Card.
⑥ Nominal input voltage range 230 – 460 VAC.
7) Order encoder model for operation with linear motors.
8) Order regen resistor for appropriate models, and motor and feedback cables separately.

BALDOR MOTION PRODUCTS

FlexDrive// Technical Data

Description		Unit	Specifications	
			1φ Models	3φ Models
Input Voltage Range	115	VAC	97-125	–
	230	VAC	220-250	–
	230-400/460	VAC	–	180-528
Input Frequency		Hz	50/60 ± 5%	
Efficiency		%	>95	
Minimum Load Inductance		µH	100	
Command Input		VDC	± 10	
Signal Resolution		bits	12	
Velocity Feedback Resolution		bits	12	
Simulated Encoder Output		ppr	512/1024/2048/4096 - RS422	
Pulse & Direction Input		VDC	+5 VDC & 24 VDC galvanically isolated (Max 1MHz)	
Handwheel Input		–	Encoder (A and B) RS422/5V (Max 4 MHz)	
Interface Bit Rate		Baud	9600, 19200, 38400, 57600, 115200	
Operating Altitude		Feet	3300 (Above derate 1.1% per 330)	
		Meters	1000 (Above derate 1.1% per 100)	
Operating Temperature		°C	0 to +40	
Storage Temperature		°C	-25 to +70	
Humidity		%	10-90 non-condensating	
Shock		G	10G	
Vibration		G	1G; 10-150 Hz	
Optional Customer	Supplied 24V Logic Input	VDC	20.4 to 28.8	
	Current @ 24Volts	Amps	1.75, 4.0 Surge	

Typical Connections

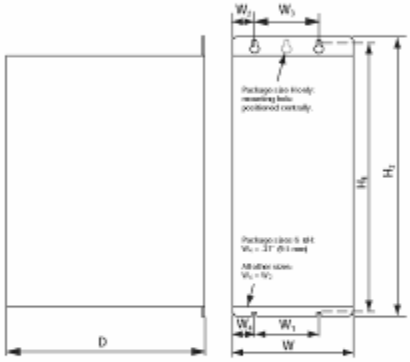


NOTE: FDH1A02TB-RN20 shown
X1 on three phase models include 2 ground pins

D-6

BALDOR MOTION PRODUCTS

FlexDrive^{II}/Flex+Drive^{II} Dimensions (inches/millimeters)



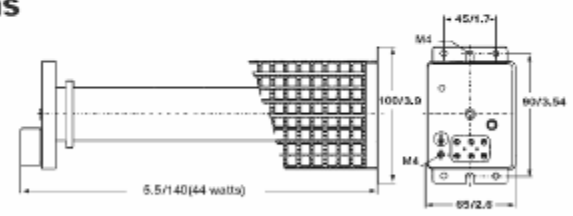
Package Size	Dimensions inches [mm]								Weight Lbs [Kg]
	W	H	D	W1	W2	W3	H1	H2	
A	2.66 [67.5]	6.81 [173]	6.00 [152]	1.57 [40]	0.59 [15]	1.57 [40]	7.70 [195.5]	8.07 [205]	2.76 [1.25]
B	3.31 [84]	6.81 [173]	6.00 [152]	1.57 [40]	0.59 [15]	1.57 [40]	7.70 [195.5]	8.07 [205]	3.42 [1.55]
C	3.64 [92.5]	6.81 [173]	6.00 [152]	1.57 [40]	0.91 [23]	1.57 [40]	7.70 [195.5]	8.07 [205]	4.63 [2.1]
D	4.29 [109]	6.81 [173]	6.00 [152]	1.57 [40]	0.91 [23]	1.57 [40]	7.70 [195.5]	8.07 [205]	5.07 [2.3]
G	2.56 [65]	14.06 [357]	10.31 [262]	1.81 [46]	1.28 [32.5]	–	15.12 [384]	15.75 [400]	10.8 [4.9]
H	5.12 [130]	14.06 [357]	12.91 [328]	4.37 [111]	1.08 [27.5]	2.95 [75]	15.12 [384]	15.75 [400]	19.95 [9.05]

Regen Resistors

115 VAC Drive			230 VAC Drive			460/400 VAC Drive		
	Regen Resistor			Regen Resistor			Regen Resistor	
Control	Catalog	Watts	Control	Catalog	Watts	Control	Catalog	Watts
FDH1A07TR-	RG22	100	FDH2A07TR-	RG39	100	FDH4A07TR-	RG68	320
						FDH4A15TR-	RG27A	320
						FDH4A20TR-	RG27A	320
						FDH4A27TR-	RG11	640

Dimensions

(millimeters/inches)



Appendix L. Raeder-Vogel wheels and rollers

-RADBERECHNUNGEN-

Kunde : **EOS Space Systems**

Rad : **173/140/076/5/65x20,8 NL56**

Radbelag	**Vulkollan 93**	E-Modul Radbelag	80	N/mm²
Durchmesser	**140** mm	E-Modul Boden	210.000	N/mm²
Radbreite	**76** mm	Querkontraktionszahl	0,45	Radbelag
Belagdicke	10 mm	Faktor	0,9	

Belastung N	Aufstandsfläche mm²	Flächendruck N/cm²	Eindrucktiefe mm
4.375	979	446,96	0,81
5.250	1.072	489,62	0,94
6.125	1.158	528,85	1,07
7.000	1.238	565,37	1,20
7.875	1.313	599,66	1,32
8.750	1.384	632,10	1,44
9.576	1.448	661,26	1,55

Vulkollan Lastrad bis 6 km/Std

Bei den Angaben handelt es sich um theoretisch ermittelte Werte, die auf wissenschaftlichen Untersuchungen und eigenen Versuchen unter bestimmten Prüfbedingungen beruhen.
Da sich jedoch die physikalischen Eigenschaften von Elastomeren unter Einflüssen von Temperatur, Feuchtigkeit, Belastungszeit, Verformungsgeschwindigkeit, usw. verändern, können die Angaben nur als Richtwerte dienen.
Es sind daraus keine rechtsverbindlichen Eigenschaften abzuleiten.

Kalkulation RÄDER-VOGEL 01.03.2005

-RADBERECHNUNGEN-

Kunde : **EOS Space Systems**

Rad : **173/140/076/5/65x20,8 NL56**

Radbelag	**Vulkollan 85**	E-Modul Radbelag	50	N/mm²
Durchmesser	**140** mm	E-Modul Boden	210.000	N/mm²
Radbreite	**76** mm	Querkontraktionszahl	0,45	Radbelag
Belagdicke	10 mm	Faktor	0,9	

Belastung N	Aufstandsfläche mm²	Flächendruck N/cm²	Eindrucktiefe mm
3.775	1.150	328,25	1,06
4.530	1.260	359,59	1,23
5.285	1.361	388,40	1,40
6.040	1.455	415,21	1,56
6.795	1.543	440,40	1,72
7.550	1.626	464,22	1,87
8.140	1.689	482,01	1,98

Vulkollan Lastrad bis 6 km/Std

Bei den Angaben handelt es sich um theoretisch ermittelte Werte, die auf wissenschaftlichen Untersuchungen und eigenen Versuchen unter bestimmten Prüfbedingungen beruhen.
Da sich jedoch die physikalischen Eigenschaften von Elastomeren unter Einflüssen von Temperatur, Feuchtigkeit, Belastungszeit, Verformungsgeschwindigkeit, usw. verändern, können die Angaben nur als Richtwerte dienen.
Es sind daraus keine rechtsverbindlichen Eigenschaften abzuleiten.

Kalkulation RÄDER-VOGEL 01.03.2005

-RADBERECHNUNGEN-

Kunde : **EOS Space Systems**

Rad : **173/140/076/5/65x20,8 NL56**

Radbelag	**Vulkollan 95**	E-Modul Radbelag	120	N/mm²
Durchmesser	**140** mm	E-Modul Boden	210.000	N/mm²
Radbreite	**76** mm	Querkontraktionszahl	0,45	Radbelag
Belagdicke	10 mm	Faktor	0,9	

Belastung N	Aufstandsfläche mm²	Flächendruck N/cm²	Eindrucktiefe mm
4.760	834	570,94	0,62
5.712	913	625,43	0,72
6.664	986	675,54	0,82
7.616	1.055	722,19	0,92
8.568	1.119	765,99	1,01
9.520	1.179	807,43	1,10
10.055	1.212	829,80	1,15

Vulkollan Lastrad bis 6 km/Std

Bei den Angaben handelt es sich um theoretisch ermittelte Werte, die auf wissenschaftlichen Untersuchungen und eigenen Versuchen unter bestimmten Prüfbedingungen beruhen.
Da sich jedoch die physikalischen Eigenschaften von Elastomeren unter Einflüssen von Temperatur, Feuchtigkeit, Belastungszeit, Verformungsgeschwindigkeit, usw. verändern, können die Angaben nur als Richtwerte dienen.
Es sind daraus keine rechtsverbindlichen Eigenschaften abzuleiten.

Kalkulation RÄDER-VOGEL 01.03.2005

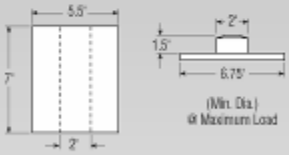
i.A.

APPENDIX M. Firestone Marsh Mellow Springs

MARSH MELLOW SPRINGS **Firestone** **0187**

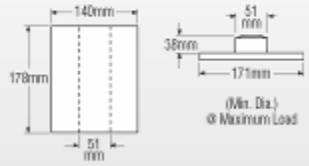
IMPERIAL

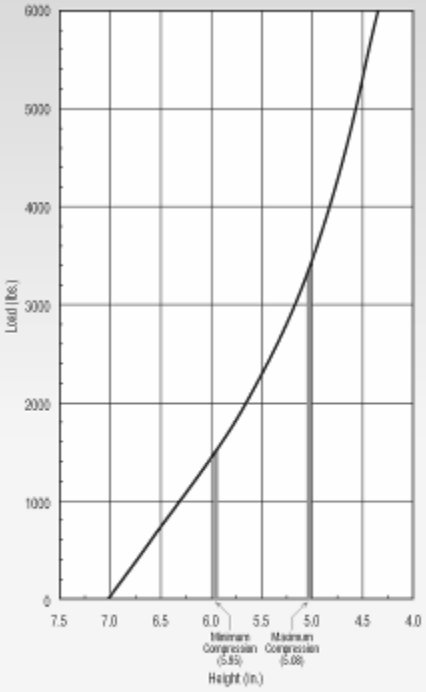
Compression (%)	15.0	20.0	22.5	25.0	27.5
Load (lbs.)	1540	2100	2460	2790	3280
Height (in.)	5.95	5.6	5.425	5.25	5.075
Rate (lbs./in.)	1440	1720	2110	2490	3040
Effective Deflection (in.)	1.07	1.22	1.17	1.12	1.08
Natural Freq. (CPM)	182	170	174	178	181
Maximum OD (in.)	5.8	6.0	6.1	6.2	6.3
Weight (lbs.)	5.07				

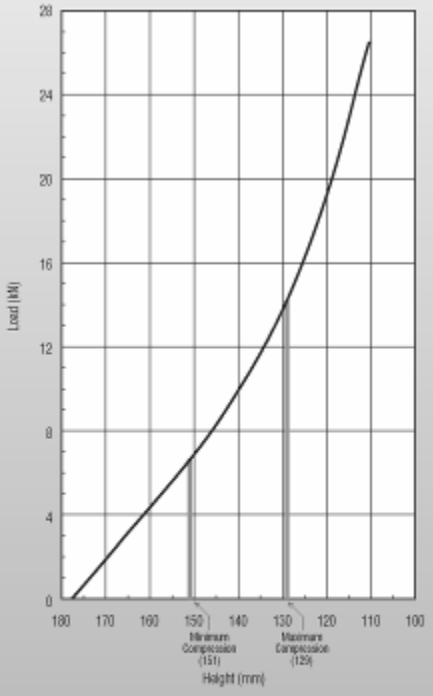


METRIC

Compression (%)	15.0	20.0	22.5	25.0	27.5
Load (kN)	6.84	9.33	10.93	12.40	14.58
Height (mm)	151	142	138	133	129
Rate (kN/m)	252	301	369	436	532
Effective Deflection (mm)	27	31	30	28	27
Natural Freq. (Hz)	3.03	2.84	2.90	2.96	3.02
Maximum OD (mm)	147	152	155	157	160
Weight (kg)	2.31				







45


MARSH MELLOW
SPRINGS
STOCKED AND DISTRIBUTED BY:
Firestone
World's Number 1
Air Spring.
FIRESTONE INDUSTRIAL PRODUCTS COMPANY
12650 Hamilton Crossing Blvd. • Carmel, Indiana 46032
1-800-888-0650 • support@firestoneindustrial.com
www.firestoneindustrial.com/Industrial
MMDM 503
Printed in U.S.A.

Appendix N. C-JAC shock absorbers

Operating Principles of Shock Absorbers

All series of CJAC shock absorbers are of such construction as shown in the following drawing. On impact the piston rod moves into the shock absorber and the hydraulic fluid is pushes into accumulator to produce resistant force. Owing to special spacing and sizing of orifices, the pressure in the inner tube remains constant throughout the entire impact stroke. By providing a linear deceleration, a CJAC shock absorber brings the impacting object to stop smoothly and quiet. At the end of the impact stroke, the return spring pushes the piston to its original piston for next cycle.

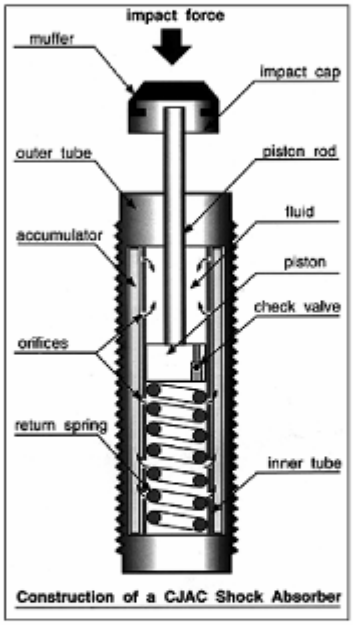
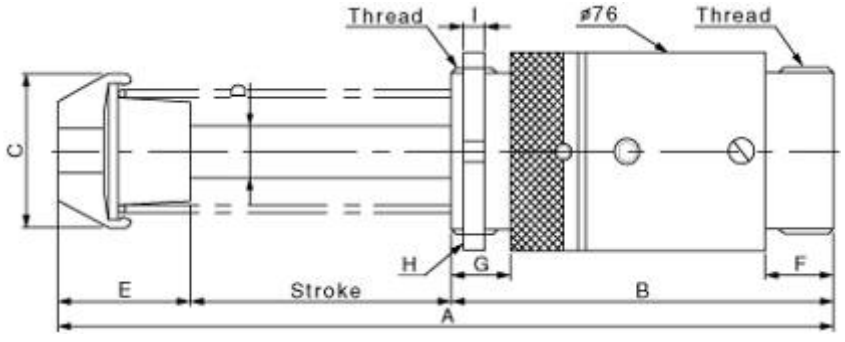


Figure 2

C-Jac AD-4250 Shock Absorber

C-Jac AD-64050 Shock Absorber



Appendix O. Contego intumescent latex passive fire barrier

- Data sheet
- Flammability test

CONTEGO

Architectural Specification
for
CONTEGO PASSIVE FIRE BARRIER LATEX

A water-based, thin film, one-component latex fire barrier coating containing 56.2% solids, by weight, is designed to protect various substrates by developing a thick char barrier (intumescent layer) when exposed to high temperatures or flame.

PRODUCT CHARACTERISTICS:

The product is a white, flat-finish coating with a nominal viscosity of 125 KU and a pH of 8.0 – 8.5.

APPLICATION EQUIPMENT:

The product can be applied with an airless sprayer (recommended psi 1,200 – 2,400, tip size 25 – 50, positive displacement) or by roller, brush, or mitt.

Recommended thickness depends on the substrate and the level of protection needed. See test data for recommendations, or call the manufacturer for technical assistance.

GENERAL:

The product polymerizes to all tested substrates and accepts top coating with alkyd, acrylic, or latex paint without loss of fire protective qualities. The product meets the following requirements for:

Spray Polyurethan Foam @ various thicknesses (see individual test reports)

- ASTM E-84.98 (UL-723) Flame Spread & Smoke Production (extended to 25 minutes)
- UBC-26.3 – Thermal Barrier Test for Interior Foam Plastic Systems
- NFPA-286 – Contribution to Room Combustibility.
- Toxicity Data (Zero toxicity/No HAZMAT)

PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).

B. Do not apply intumescent paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; if temperature is less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

INTERIOR INTUMESCENT FINISH COATS

1. Prime Coat: Is not required, but if used, factory-formulated Zinsser 1-2-3, Kilz, or similar applied at spreading rate recommended by manufacturer.
2. Intermediate Coat: Intumescent-type, fire-retardant paint applied at spreading rate of 20 mils wet using multiple coats to achieve a total dry film thickness of 14 MILS (DFT).
3. Finish Coat – For color or sheen applied according to manufacturer's recommendations.

EXAMINATION

C. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and other conditions affecting performance of work.

1. Proceed with application only after unsatisfactory conditions have been corrected and surfaces to receive paint are thoroughly dry.

2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total intumescent paint system for various substrates. On Architect's request, furnish information on characteristics of finish materials to ensure use of compatible primers.

PREPARATION

E. General: Remove hardware, hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. Make sure the surface of the foam is free of gouges, holes, exposed cells, and that the surface is stable and not crumbling or deteriorated. If any such defects are found, repair them prior to proceeding.

2. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

F. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of intumescent paint systems.

1. Schedule cleaning and painting application so dust and other contaminants will not fall on wet, newly painted surfaces.

G. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturers written instructions for each particular substrate condition and as specified. Coordinating shop-applied primers with finish coats is critical. See "Coordination of Work" Paragraph in "Examination" Article. If compatibility problems develop, it may be necessary to provide barrier coats over shop-applied primers or to remove primer and reprime substrate.

H. Material Preparation: Mix and prepare materials according to manufacturers written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density, and as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

3. Do not thin or mix with other .

APPLICATION

I. General: Apply intumescent paints according to manufacturers written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable paint film.

2. Provide finish coats that are compatible with primers used.

3. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces.

J. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If

sanding is required to produce a smooth, even surface according to manufacturer's written instructions.

2. If undercoats, stains, or other conditions show through the final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3. Allow enough time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where applying another coat of paint does not cause the undercoat to loose adhesion or cause the finish to crack.

K. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required. (See above).

L. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate for surface to be coated. Provide total dry film thickness of entire system as recommended by manufacturer.

M. Prime Coat: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to substrates required to be painted that have not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas appears in the first coat.

N. Produce a smooth surface film using multiple coats. Provide a finish free of laps, runs, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

O. Completed Work: Match approved samples for texture and coverage. Remove, refinish, or repaint work not complying with specified requirements.

CLEANING AND PROTECTION

P. Cleanup: At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by proper methods. Be careful not to scratch or otherwise damage adjacent finished surfaces.

Q. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is completed, touch up and restore damaged or defaced surfaces. Comply with PDCA P1.

Manufactured by Contego International, Inc., Rochester, IN (USA) or other facility having been registered to the International Organization for Standardization ISO 9001:2000 standard for quality.

Complete test results. MSDS, Application Data and other information is available on the World Wide Web at http://www.contegointernational.com

US-D-OPS-04-02-T

SGS U.S. Testing Company Inc.

291 Fairfield Avenue • Fairfield, NJ 07004 • Tel: 973-575-5252 • Fax: 973-575-8271

CLIENT: Contego Global Holdings
15205 E 200 S
Akron, IN 46910

Test Report No:	150747-2-R1	Date:	February 23, 2001

The following samples were submitted by the Client as:

Rated Class 1 Polyurethane Foam Insulation Coated with Pyrologistix Intumescent Paint

DATE OF RECEIPT: January 4, 2001

TESTING PERIOD: January 17, 2001

AUTHORIZATION: Client's Purchase Order Number 2001-001.

TESTS REQUESTED: The submitted sample was tested for Flammability in accordance with the procedures outlined in ASTM E-84-98.

PREPARED BY:

Mark Ostrovsky, Technician
Fire Technology
lv

SIGNED FOR AND ON BEHALF OF SGS U.S. TESTING COMPANY INC.

Dominick Lepore, Manager
Fire Technology

Page 1 of 6

US-D-OPS-04-03-T

SGS U.S. Testing Company Inc.

Report No.:
150747-2-R1
DATE: February 23, 2001
PAGE 2 OF 6

CLIENT: Contego Global Holdings

INTRODUCTION:

This report presents test results of Flame Spread and Smoke Developed Values per ASTM E-84-98. The report also includes Material Identification, Method of Preparation, Mounting and Conditioning of the specimens.

The tests were performed in accordance with the specifications set forth in ASTM E-84-98, Standard Test Method for Surface Burning Characteristics of Building Materials", both as to equipment and test procedure. This test procedure is similar to UL-723, ANSI No. 2.5, NFPA No. 255 and UBC 42-1.

The test results cover two parameters: Flame Spread and Smoke Developed Values during a 10-minute fire exposure. Inorganic cement board and red oak flooring are used as comparative standards and their responses are assigned arbitrary values of 0 and 100, respectively.

PREPARATION AND CONDITIONING:

Sections of the material were arranged to form a 24" x 24'0" sample. The sample was laid on a 2-inch galvanized hexagonal wire mesh, supported by steel rods spanning the width of the tunnel.

The sample was conditioned at 73° ±5° Fahrenheit and 50 ±5% relative humidity.

TEST PROCEDURE:

The tunnel was thoroughly pre-heated by burning natural gas. When the brick temperature, sensed by a floor thermocouple, had reached the prescribed 105° Fahrenheit ±5° Fahrenheit level, the sample was inserted in the tunnel and test conducted in accordance with the standard ASTM E-84-98 procedures.

The operation of the tunnel was checked by performing a 10-minute test with inorganic board on the day of the test.

US-D-OPS-04-03-T

SGS U.S. Testing Company Inc.

Report No.: 150747-2-R1
DATE: February 23, 2001
PAGE 3 OF 6

CLIENT: Contego Global Holdings

TEST RESULTS:

The test results, calculated in accordance with ASTM E-84-98 for Flame Spread and Smoke Developed Values are as follows:

Test Specimen	:	Rated Class 1 Polyurethane Foam Insulation Coated with Pyrologistix Intumescent Paint
Flame Spread Index*	:	20
Smoke Developed Value*	:	435

*Rounded off to the nearest 5 units. Graphs of the Flame Spread, Smoke Developed and Time-Temperature are shown on the attached charts at the end of this report.

OBSERVATIONS:

Ignition was noted after 23 seconds followed by charring and melting of the specimen directly exposed to the flame. Also observed was dripping as the flamefront advanced 5.0 feet after 5.00 minutes. Significant afterburn was evident upon test completion.

After an additional 15 minute burn, the sample showed no evidence of significant progressive combustion. The flamefront did progress to 6.0 feet at 13 minutes and showed no further progression.

RATING:

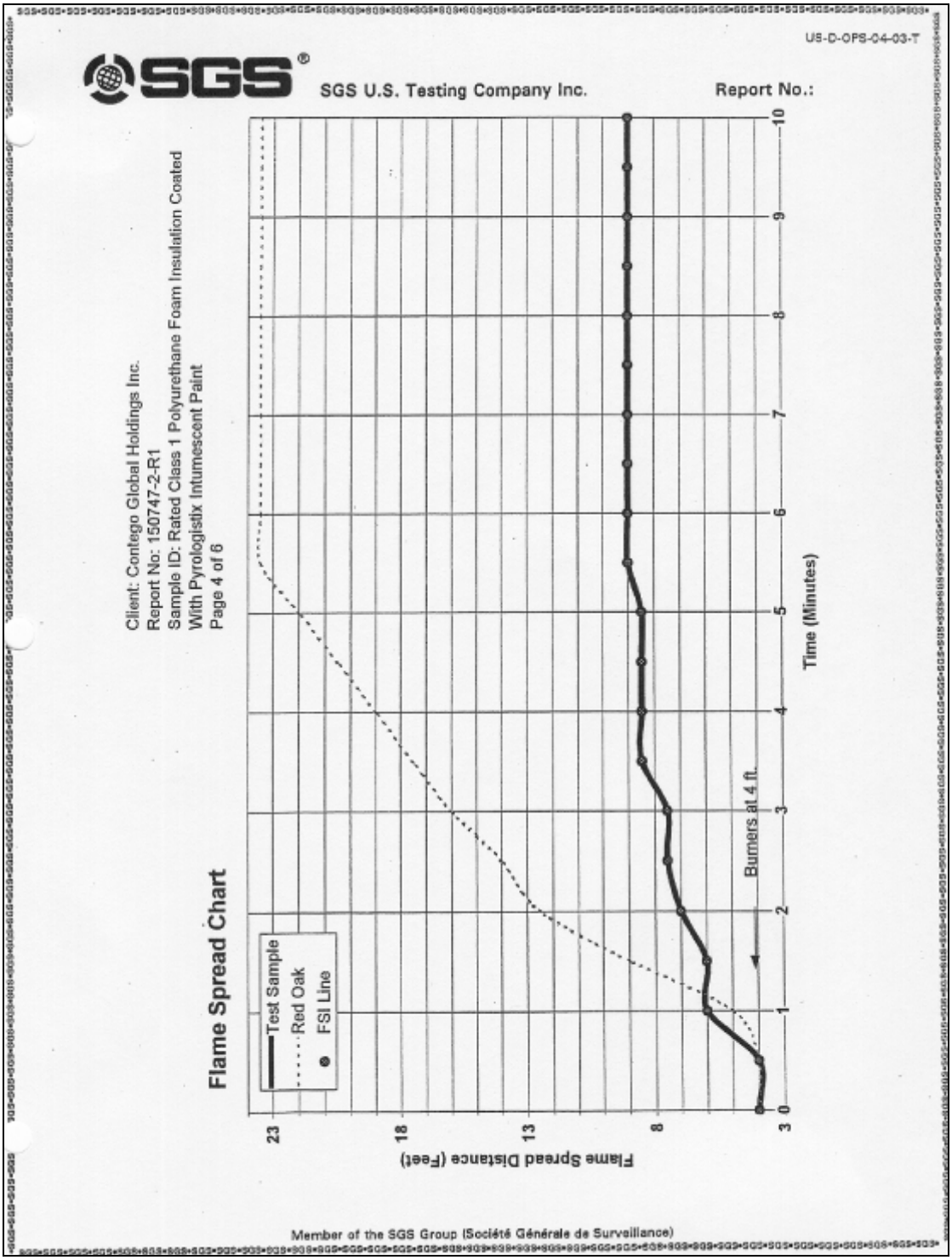
The National Fire Protection Association Life Safety Code 101, Section 6-5.3, "Interior Wall and Ceiling Finish Classification", has a means of classifying materials with respect to Flame Spread and Smoke Developed when tested in accordance with NFPA 255, "Method of Test of Surface Burning Characteristics of Building Materials", (ASTM E-84).

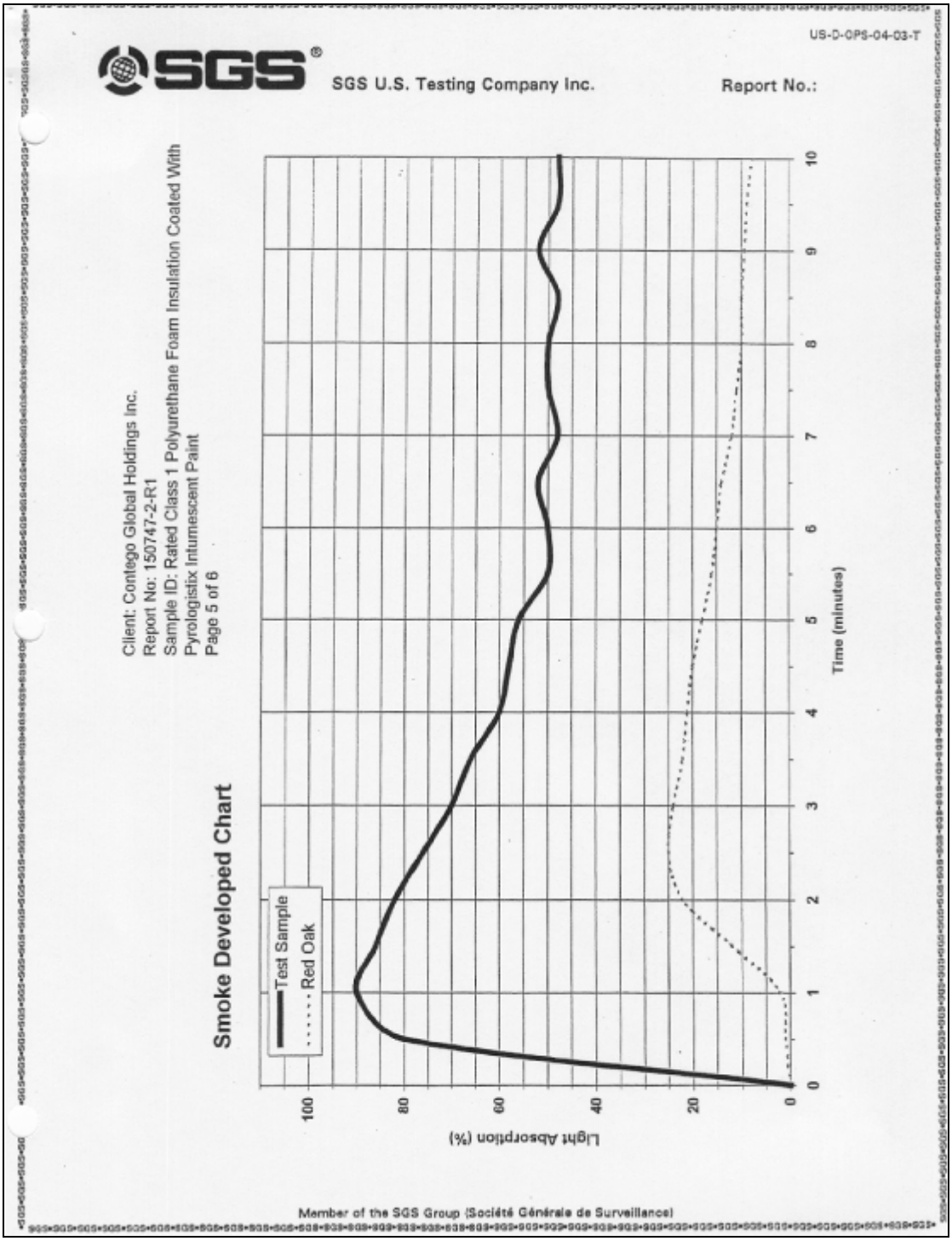
The classifications are as follows:

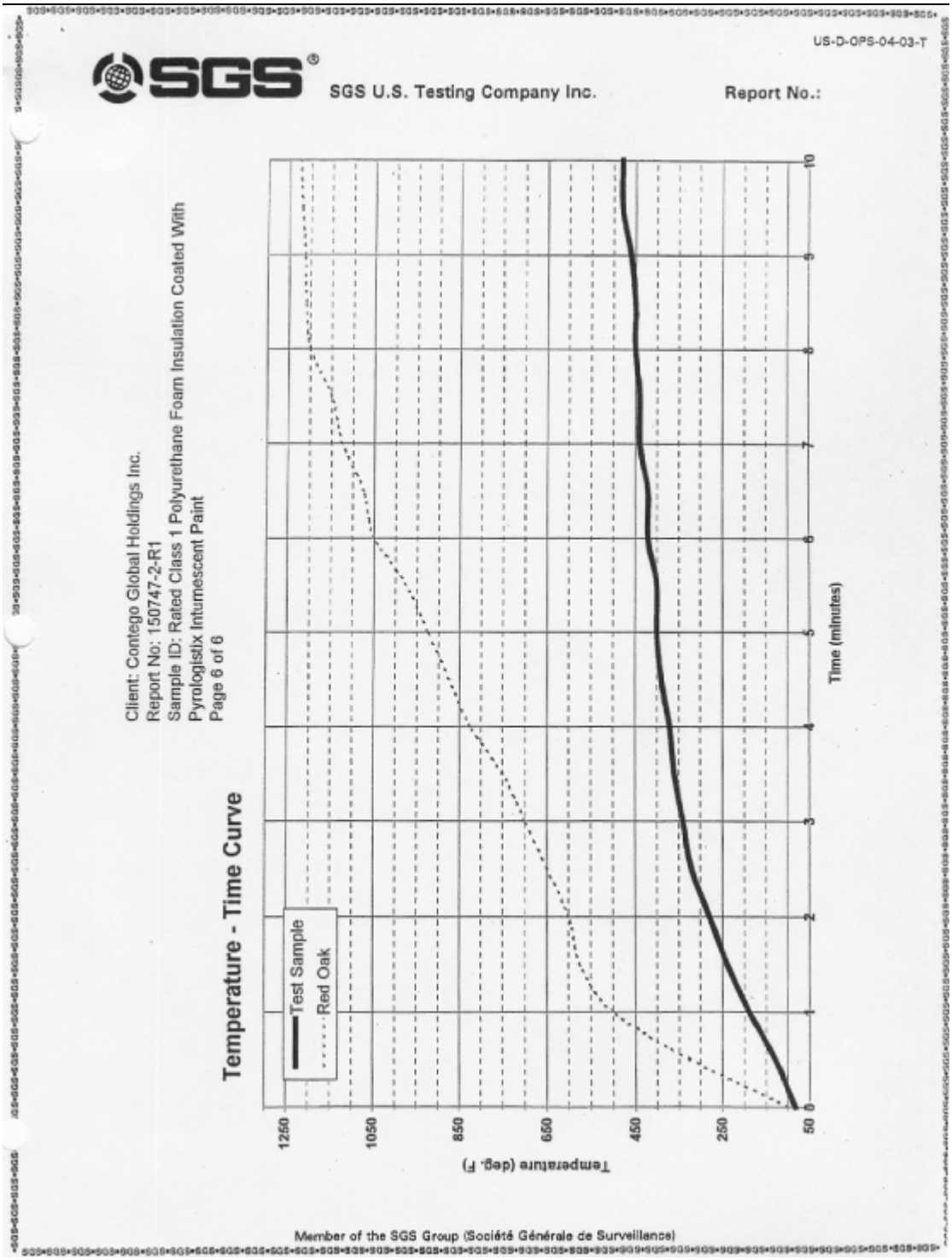
Class A Interior Wall & Ceiling Finish:	Flame Spread -	0-25;
	Smoke Developed -	0-450
Class B Interior Wall & Ceiling Finish:	Flame Spread -	26-75;
	Smoke Developed -	0-450
Class C Interior Wall & Ceiling Finish:	Flame Spread -	76-200;
	Smoke Developed -	0-450

Since the sample received a Flame Spread of 20 and a Smoke Developed Value of 435, it would fall into the Class A Interior Wall & Ceiling Finish Category.

****End of Report****


US-D-OPS-04-03-T
SGS U.S. Testing Company Inc.
Report No.:
Client: Contego Global Holdings Inc.
Report No: 150747-2-R1
Sample ID: Rated Class 1 Polyurethane Foam Insulation Coated
With Pyrologistix Intumescent Paint
Page 4 of 6
Flame Spread Chart
Test Sample
Red Oak
FSI Line
Burners at 4 ft.
Time (Minutes)
Flame Spread Distance (Feet)
23
18
13
8
3
0
1
2
3
4
5
6
7
8
9
10
Member of the SGS Group (Société Générale de Surveillance)


US-D-OPS-04-03-T
SGS U.S. Testing Company Inc.
Report No.:
Client: Contego Global Holdings Inc.
Report No: 150747-2-R1
Sample ID: Rated Class 1 Polyurethane Foam Insulation Coated With Pyrologistix Intumescent Paint
Page 5 of 6
Smoke Developed Chart
Test Sample
Red Oak
Light Absorption (%)
Time (minutes)
Member of the SGS Group (Société Générale de Surveillance)


US-D-OPS-04-03-T
SGS U.S. Testing Company Inc.
Report No.:
Client: Contego Global Holdings Inc.
Report No: 150747-2-R1
Sample ID: Rated Class 1 Polyurethane Foam Insulation Coated With
Pyrologistix Intumescent Paint
Page 6 of 6
Temperature - Time Curve
Test Sample
Red Oak
Temperature (deg. F)
1250
1050
850
650
450
250
50
Time (minutes)
0
1
2
3
4
5
6
7
8
9
10
Member of the SGS Group (Société Générale de Surveillance)

Appendix P. Lift-Master SD3321LR/ SD3321Ll industrial door opener

SPECIFICATIONS

MOTOR

TYPE: .....Continuous duty

HORSEPOWER: .....1/3, 1/2, 3/4 & 1 Hp

SPEED:.....1725 RPM

VOLTAGE:.....115, 208-230 Single phase
230, 380, 460, 575 Three Phase

CURRENT:.....See motor nameplate

ELECTRICAL

TRANSFORMER:.....24VAC Secondary

CONTROL STATION:.....NEMA 1 three button station.
OPEN/CLOSE/STOP W/ LED

WIRING TYPE:.....C2 (Factory Shipped)
Momentary contact to OPEN & STOP, constant pressure to CLOSE, open override plus wiring for sensing device to reverse. See pages 15 thru 19 for optional wiring types and operating modes.

LIMIT ADJUST: .....Linear driven, fully adjustable screw type cams. Adjustable to 24 feet.

MECHANICAL

DRIVE REDUCTION:.....Primary: Heavy duty (5L) V-Belt. Secondary: #41 chain/sprocket. Output: #48 chain (1/3 &1/2Hp) or #41 chain (3/4 &1Hp)

OUTPUT SHAFT SPEED:.....140 R.P.M.

DOOR SPEED:.....11" - 12" per sec. depending on door

BRAKE: .....Solenoid actuated disc brake on 3/4 & 1Hp

BEARINGS:.....Output Shaft: Shielded Ball Bearing. Clutch Shaft: IronCopper sintered and oil impregnated.

SAFETY

DISCONNECT:.....Quick disconnect door arm for emergency manual door operation.

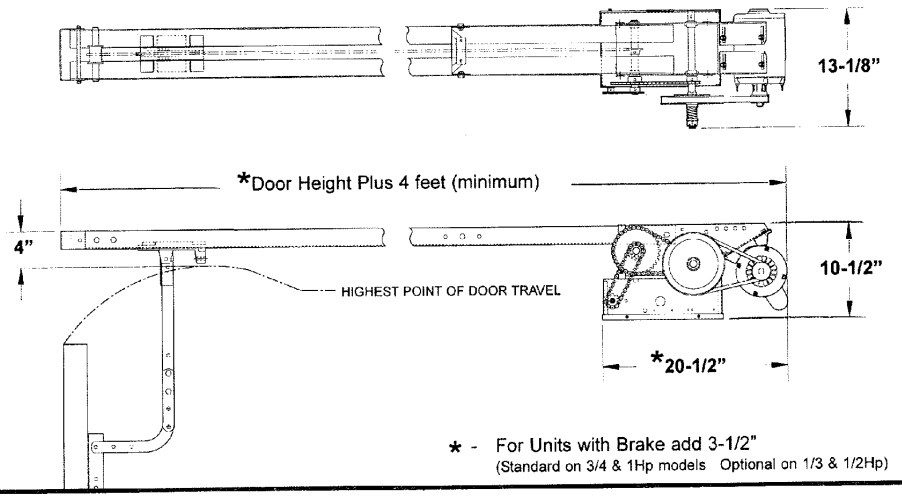
SAFETY PHOTO EYES: (Optional) Thru beam or retro reflective devices used to provide non-contact safety protection. Directly interface to Lift Master CPS-L or CPS-LN4 Commercial Protector Systems.

SAFETY EDGE:.....(Optional) Electric or pneumatic sensing device attached to the bottom edge of door.

A REVERSING DEVICE IS STRONGLY RECOMMENDED FOR *ALL* COMMERCIAL OPERATOR INSTALLATIONS. *REQUIRED* WHEN THE 3 BUTTON CONTROL STATION IS OUT OF SIGHT OF DOOR OR ANY OTHER CONTROL (AUTOMATIC OR MANUAL) IS USED.

WEIGHTS AND DIMENSIONS

HANGING WEIGHT: .....**80-110 LBS.**



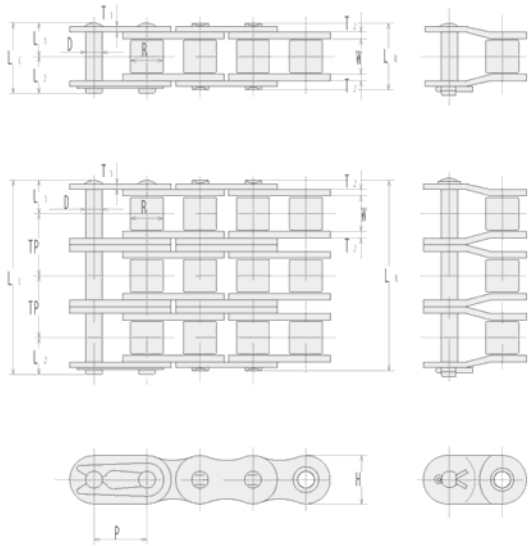
* - For Units with Brake add 3-1/2"
(Standard on 3/4 & 1Hp models Optional on 1/3 & 1/2Hp)

3

Appendix Q. SY roller chain

ROLLER CHAINS

ROLLER CHAINS



Item	See Page
Attachment Chain	64 65
Rust Less	36 40 42
SLR Self-Lube Chain	51
MF Maintenance Free	56 76
Drive Chain Selection	76 77

Standard Packing	12B	16B
1 Unit (10')	160P	120P
1 Unit (5m)	262P	198P

12B

SY Chain No. (B S)	Pitch	Dimensions - mm											Minimum Ultimate Strength	Maximum Allowable Load	Average Chain Weight
		Roller		Pin					Plate			Trans. Pitch			
		Width	Dia.	Dia.	Length				Height	Thickness					
	P	W	R	D	L_R	L_C	L_1	L_2	H	T_1	T_2	TP	kN	kN	kg/m
12B	19.05	11.68	12.07	5.72	22.0	23.6	11.0	12.6	16.1	1.8		19.46	28.9	7.06	1.14
-2					41.6	43.1							57.8	12.0	2.28
-3					61.1	62.7							86.7	17.6	3.36

16B

SY Chain No. (B S)	Pitch	Dimensions - mm											Minimum Ultimate Strength	Maximum Allowable Load	Average Chain Weight
		Roller		Pin					Plate			Trans. Pitch			
		Width	Dia.	Dia.	Length				Height	Thickness					
	P	W	R	D	L_R	L_C	L_1	L_2	H	T_1	T_2	TP	kN	kN	kg/m
16B	25.40	17.02	15.88	8.26	35.1	38.2	17.6	20.6	21.0	3.2	4.0	31.88	60	12.6	2.59
-2					67.2	70.1							106	21.4	5.13
-3					99.2	102.5							160	31.5	7.68

※Refer to page 80. "Selection of offset link"

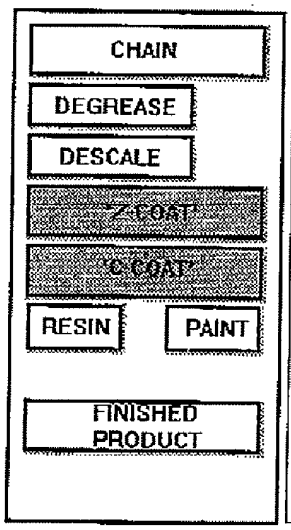
A.C.N. 004 387 455

'NEO' CZ COATING

INORGANIC FILM FORMED WITH EVEN GREATER CORROSION RESISTANCE------ C-Z COAT

C-Z COAT IS A COMBINATION OF C-COAT AND Z-COAT THAT IMPROVES THEIR ALREADY HIGH CORROSION RESISTANT PROPERTIES.

C-COAT IS A NON AQUEOUS CHROMATING METHOD , THE POROUS PROPERTIES OF Z-COAT CAN BE UTILIZED TO FORM A FILM THAT DEMONSTRATES EXCELLENT CORROSION RESISTANCE CHARACTERISTICS.



* CZ-COAT EXHIBITS SUPERIOR CORROSION RESISTANT PROPERTIES PARTICULARLY IN HIGH TEMPERATURES COMPARED TO EXISTING ELECTRO ZINC PLATING
* EVEN MORE OUTSTANDING THAN EXISTING PHOSPHATING ETC. AS A CORROSION RESISTANT SURFACE TREATMENT
*NO HYDROGEN EMBRITTLEMENT
*NO DROPS IN STRESS CAUSED THROUGH HEAT
*HAS ALL THE OTHER EXCELLENT PROPERTIES OF **C-COAT** AND **Z-COAT.**

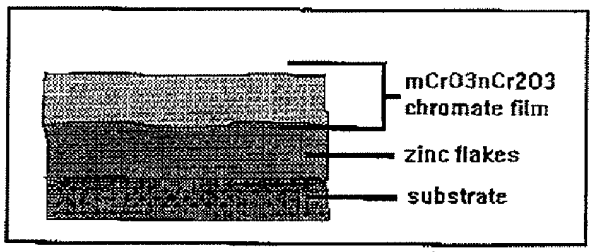
APPLICATIONS

* HIGH TEMPERATURE CHAIN DRIVES
*WASHDOWN AREAS IE: DAIRIES,ABATTOIRS,ETC;
*HIGH HUMIDITY ENVIRONMENTS
*

AVAILABLE FROM R.K.M. CHAINS PTY LTD
PH (03) 9357 9669 FAX (03) 9357 9668
OR FROM YOUR LOCAL R.K.M. CHAINS APPOINTED DISTRIBUTOR

C Z COAT'S film structure and rust prevention mechanism.

THE **Z-COAT** FILM IS FORMED BY PROJECTING **Z-IRON** ONTO THE SURFACE OF THE MATERIAL TO TRANSFER A ZINC LAYER . THE TRANSFERRED ZINC IS LAMINATED AND BONDED IN A THIN LAYER ONTO THE TREATED SURFACE . THE LAYER MAKES A METAL TO METAL CONTACT EXHIBITING GOOD CURRENT CARRYING PROPERTIES AMONG ZINC FLAKES , AND BETWEEN THE ZINC FLAKES AND SUBSTRATE , AND THUS THE GALVANIC PROTECTIVE CURRENT OF THE ZINC FLOWS FOR THE CORRECT AMOUNT.



C-COAT FILM IS FORMED BY TREATING WITH **COOL-CHRON** TO PARTIALLY REDUCE CHROMIC ACID ON THE THE TREATED SURFACE , AND BY FORMING AN AMORPHOUS POLYMER WITH A COMPOSITION OF mCrO3nCr2O3 , NAMELY A CHROMATE FILM .

CZ COAT IS A COMBINATION OF BOTH **C COAT** AND **Z COAT** THAT FORMS A CHROMATE FILM ON THE SURFACE OF THE LAMINATED ZINC FLAKES AND IN VOIDS . **COOL-CHRON** DEMONSTRATES EXTREMELY LOW SURFACE TENSION DUE TO IT BEING A NON-AQUEOUS SOLUTION , AND PENETRATES INTO FINE GAPS . IT REACHES EVEN THE SURFACE OF THE SUBSTRATE , AND PASSIVATES ITS SURFACE .

THE CORROSION PROTECTION MECHANISM OF **CZ-COAT** HAS THE COMPOUNDED RESULT OF THE FOLLOWING THREE FACTORS: GALVANIC PROTECTION OF THE ZINC PROPERLY CONTROLLED BY CHROMIC ACID , PASSIVATION OF THE SUBSTRATE BY THE CHROMIC ACID , AND THE BARRIER EFFECT OF THE ZINC FLAKES .

THROUGH THE COMBINED USE OF BOTH **C-COAT** AND **Z-COAT** FUNCTION SYNERGISTICALLY , AND AMAZINGLY HIGH DEGREE OF CORROSION RESISTANCE IS DEMONSTRATED .

Appendix R. Shutter heater cables

Appendix S. Siemens valves and accessories

SIEMENS

4463

Three-port seat valves with male thread, PN16

VXG41...

Three-port seat valves with male thread, PN16

- **Bronze Rg5**
- **DN15 ... DN50 mm (½"... 2")**
- **k_{vs} 1.6 ... 40 m^3/h**
- **Stroke 20 mm**
- **Can be equipped with actuators SQX..., SKD... and SKB...**
- **Fittings can be delivered separately**

Use

In heating and domestic water systems as well as in ventilating and air conditioning systems as **a control valve for "mixing" and "diverting" functions**.
For open and closed circuits.

Media

Standard version
with dezincification-free stem sealing gland for:

Cooling water **Chilled water** **Low temperature hot water** **Domestic water** **High temperature hot water** **Water with anti-freeze** [1) 2)] **Brine** [1) 2)]	−25 ... +130 °C

1) Media below 0 °C: ASZ6.5 stem heating element required to prevent freezing of the valve stem in the sealing gland.

2) Water with anti-freeze and brine: down to −25 °C as per DIN 3158 (stress case I)

Type summary

Standard version

Type	DN [mm]	k_{vs} [m^3/h]	S_v	$\Delta p_{vmax.}$ mixing [kPa]	$\Delta p_{vmax.}$ diverting 2) [kPa]
VXG41.1301 1)	15/6	1.6			
VXG41.1401 1)	15/10	2.5	> 50		
VXG41.15	15	4.0			
VXG41.20	20	6.3		800	200
VXG41.25	25	10			
VXG41.32	32	16	> 100		
VXG41.40	40	25			
VXG41.50	50	40			

Special version with type suffix 01 = with tight bypass

Type	DN [mm]	k_{vs} [m^3/h]	S_v	$\Delta p_{vmax.}$ mixing [kPa]	$\Delta p_{vmax.}$ diverting 2) [kPa]
VXG41.1301 1)	15/6	1.6			
VXG41.1401 1)	15/10	2.5	> 50		
VXG41.1501	15	4.0			
VXG41.2001	20	6.3		800	200
VXG41.2501	25	10			
VXG41.3201	32	16	> 100		
VXG41.4001	40	25			
VXG41.5001	50	40			

1) This DN, as a standard, is equipped with a tight bypass
2) If noise is permitted, the same values apply as for mixing

DN = Nominal diameter
k_{vs} = Nominal flow value as per VDI 2173
S_v = Rangeability as per VDI 2173
$\Delta p_{vmax.}$ = Max. permissible differential pressure across the control path (II–I = mixing or I–II = diverting) of the valve valid for entire stroke range

Accessories

Electric stem heating element, AC 24 V, required for media below 0 °C : **ASZ6.5**

Ordering

Indicate type.
Example: **VXG41.25**
The fittings must be ordered separately.

Delivery

The valve, actuator and possible fittings are packed and supplied separately.

Equipment combinations

Valves		Actuators 1)						Fittings
		SQX... 2)		SKD...		SKB...		
	H_{100} [mm]	mixing	diverting	mixing	diverting	mixing	diverting	
		Δp_{max} [kPa]						Type
VXG41.1301								
VXG41.1401								**ALG15**
VXG41.15								
VXG41.20	20	800	200 3)	800	200 3)	800	200 3)	**ALG20**
VXG41.25								**ALG25**
VXG41.32		600						**ALG32**
VXG41.40		400	150 3)	700	150 3)		150 3)	**ALG40**
VXG41.50		250	100 3)	400	100 3)		100 3)	**ALG50**
Data sheet		**4554**		**4561**		**4564**		

1) Actuators available for delivery: • AC 24 V / AC 230 V with 3-position signal
• AC 24 V with proportional pos. signal DC 0...10 V or DC 4...20 mA
2) The Δp_{max} and Δp values are valid for the new SQX32... / SQX82... and SQX62 actuators; deliverable from January 1999
3) If noise is permitted, the same values apply as for mixing

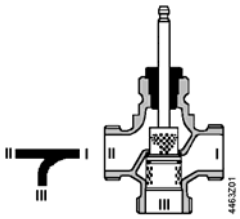
H_{100} = 100 % stroke of the valve and the actuator
Δp_{max} = Max. permissible differential pressure across the control path (II-I = mixing or I-II = diverting) of the valve across the entire actuating range of the motorized valve

Pneumatic actuators

Pneumatic actuators are available on request from your local office.
Application is possible only if the VXG41... is used as a mixing valve.

Mechanical design

Valve cross-section



Guided perforated plug which is integrated in the valve stem.

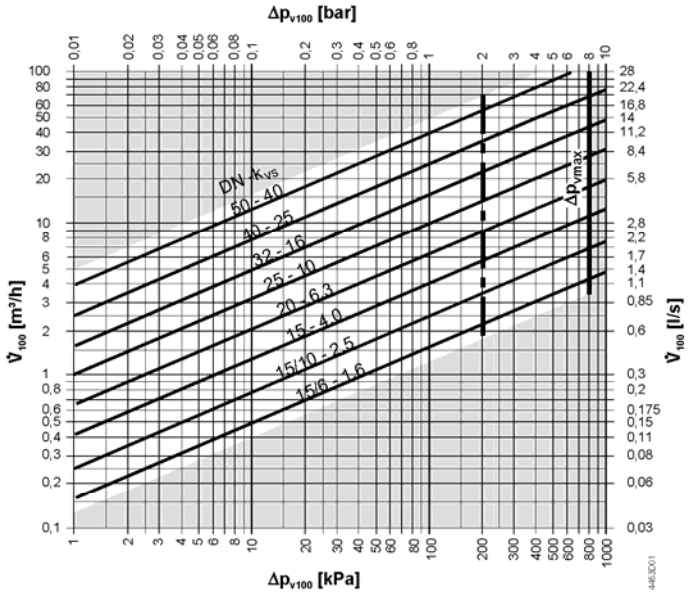
The through-port seat is attached to the valve body with the aid of special gland material.

Disposal

The various material types used require that you disassemble the unit and sort the components prior to disposal.

Sizing

Sizing diagram



100 kPa = 1 bar ≈ 10 mWG

1 m³/h = 0.278 kg/s water at 20 °C

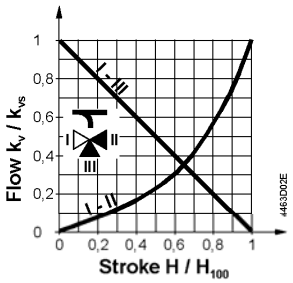
——— = $\Delta p_{vmax.}$ = Max. permissible differential pressure across the **mixing valve's II–I control path** (actuator) valid for the entire stroke range

— • — = $\Delta p_{vmax.}$ = *Max. permissible differential pressure across the* ***diverting valve's I–II control path*** (actuator) valid for the entire stroke range

Δp_{v100} = Pressure difference across the fully opened valve (actuator) across the control path (II–I = mixing or I-II = diverting) at flow $\dot{V}_{100}$

$\dot{V}_{100}$ = Flow in m³/h

Valve flow characteristic



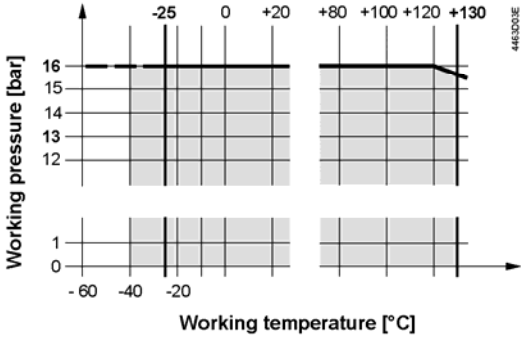
Use the three-port valve primarily as a mixing valve

Valve flow characteristic in the
Through-port
0 ... 30 %: linear
30 ...100 %: n_{gl} = 3 as per VDI / VDE 2173
Bypass
0...100 %: linear

Mixing: **Flow from port II and port III to port I**
Diverting: **Flow from port I to port II and port III**

Port I = constant flow
Port II = variable flow
Port III = bypass (variable flow)

Working pressure and temperature



Working pressure staged as per ISO 7268 and EN 1333 at operating temperatures of −25 ... +130 °C as per DIN 4747 and DIN 3158.

Notes

Engineering

We recommend installation in the return pipe, as the temperatures in this pipe are lower for applications in heating systems, which in turn, extends the stem sealing gland's life. **Water quality requirements as per VDI 2035.**

⚠ **In open circuits**, there is a risk of valve plug seizing caused by scale deposits. Thus, use only the most powerful actuator SKB... for these applications. Additionally, periodic actuation (twice or three times per week) must be planned. **Always use** a **strainer** upstream of the valve.

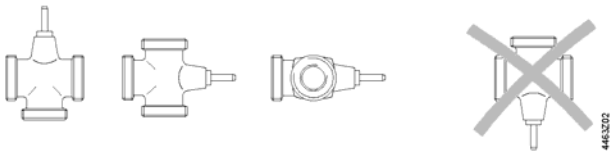
We generally recommend that you install a **strainer even with closed circuits** to increase the valve's functional safety.

⚠ **For media below 0 °C**, use the electric **ASZ6.5 stem heating element** to prevent the valve stem from freezing in the sealing gland. For safety reasons, the stem heating element has been designed for **AC 24 V / 30 W** operating voltage.

Mounting

Both valve and actuator can easily be assembled at the mounting location. Neither special tools nor adjustments are required.
The valve is supplied with mounting instructions.

Mounting positions



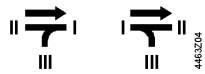
Permissible | Not permissible

Direction of flow

When mounting, pay attention to the ***valve's flow direction symbol***:

Mixing from II / III to I

Diverting from I to II / III



Commissioning ⚠

Commission the valve only if the actuator has been mounted correctly.

Stem retracts: Through-port opens, bypass closes
Stem extends: Through-port closes, bypass opens

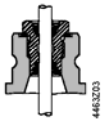
Service ⚠

For actuator service work: Turn off the pump and the operating voltage, close the shutoff valves, depressurize the pipes and allow them to cool down. Disconnect the electrical connections, where required, from the terminals. Re-commission the valve only if the actuator has been mounted correctly.

Stem sealing gland

The glands can be exchanged without removing the valve, provided the pipes are depressurized and cooled off and the stem surface is unharmed. If the stem is damaged in the gland range, replace the entire stem-plug-unit. Contact your local office or branch.

Spare parts
Standard version



Replacement for EPDM-O ring sealing gland made from dezincification-free brass, including flat seal made from copper, for cooling water, chilled water, low temperature hot water, high temperature hot water, and brine –25 ... +130 °C

For VXG41... DN15 ... DN50 (Stem dia. 10 mm) **4 284 8874 0**

Warranty

The use of third-party actuators expressly voids any warranty claims.

The technical data Δp_{max}, Δp_s, leakage rate, noise level and life apply only when used together with the Landis & Staefa actuators as listed in "Type summary".

Technical data

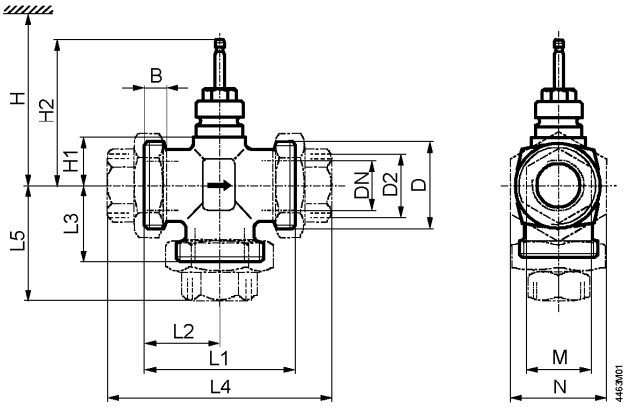
Function data

PN class	PN16
Valve flow characteristic	
Through-port	
0 ... 30 %	linear
30 ...100 %	n_{gl} = 3 as per VDI / VDE 2173
Bypass	
0 ... 100%	linear
Leakage rate	
Through-port	0 ... 0.02 % of k_{vs} value, VDI / VDE 2173
Bypass	
Standard version	0,5 ... 2 % of k_{vs} value, VDI / VDE 2173
Special versions with type suffix **01**	0 .... 0.02 % of k_{vs} value
Permissible pressure	1600 kPa (16 bar), ISO 7268 / EN 1333
Working pressure	DIN 4747 / DIN 3158 in the range of –25 ... +130 °C

	Threaded connection	
	Valve	G...B according to ISO 228/1
	Fittings	Rp... according to ISO 7/1
	Stroke	20 mm
Materials	Valve body	bronze G-CuSn5ZnBb (Rg5) as per DIN 1705
	Seat, plug, and stem	stainless steel
	Sealing gland	
	Standard version	dezincification-free brass
	Special version **01**	dezincification-free brass
	Gland materials	EPDM-O rings
	Fittings ALG...	black malleable cast iron

Dimensions

All dimensions in mm



DN [mm]	B	D	D2	H1	H2	L1	L2	L3	L4	L5	M	N	Weight without fittings [kg]
15	10	G1B	Rp½	26	122.5	100	50	50	146	73	26	39	1.20
20		G1¼B	Rp¾						148	74	32	48	1.25
25	14	G1½B	Rp1	34	130.5	105	52.5	52.5	160	80	38	54	1.50
32		G2B	Rp1¼						168	84	48	67	2.10
40	15	G2¼B	Rp1½	46	142.5	130	65	65	198	99	53	73	2.60
50	16	G2¾B	Rp2			150	75	75	222	111	66	90	3.80

DN	H		
[mm]	**SQX...**	**SKD...**	**SKB...**
15	> 450	> 525	> 600
20			
25	> 460	> 535	> 610
32			
40	> 470	> 545	> 620
50			

DN = Nominal diameter
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, service, etc.
H1 = Dimension from the pipe centre to install the actuator (upper edge)
H2 = Valve in the "Closed" position means that the stem is fully extended

SIEMENS

4 363

Two-port seat valves with male thread, PN16

VVG41...

Two-port seat valves with male thread, PN16

- **Bronze Rg5**
- **DN15 ... DN50 mm (½" ... 2")**
- **k_{vs} 0.63 ... 40 m^3/h**
- **Stroke 20 mm**
- **Can be equipped with actuators SQX..., SKD... and SKB...**
- **Fittings can be delivered separately.**

Use

For use in heating and domestic water systems as well as in ventilating and air conditioning systems as a **control or safety shutoff valve as per DIN 32730. For open and closed circuits.**

Media

Standard version with dezincification-free stem sealing gland for:	
Cooling water **Chilled water** **Low temperature hot water** **Domestic water** **High temperature hot water** **Water with anti-freeze** [1) 2)]	−25 ... +130 °C
Saturated steam (up to max. 1.5 bar abs.)	
Brine [1) 2)]	

1) Media below 0 °C: ASZ6.5 stem heating element required to prevent freezing of the valve stem in the sealing gland.

2) Water with anti-freeze and brine: down to −25 °C as per DIN 3158 (stress case I)

Special refrigerant valves with magnetic actuators are used for applications with refrigerants R...; see data sheets 4700 ... 4799.

Type summary

Standard version

Type	DN [mm]	DN [inch]	k_{vs} [m^3/h]	S_v	$\Delta p_{vmax.}$ [kPa]
VVG41.11	15/2.5	½"	0.63		
VVG41.12	15/4	½"	1.0		
VVG41.13	15/6	½"	1.6	> 50	
VVG41.14	15/10	½"	2.5		
VVG41.15	15	½"	4.0		800
VVG41.20	20	¾"	6.3		
VVG41.25	25	1"	10		
VVG41.32	32	1¼"	16	> 100	
VVG41.40	40	1½"	25		
VVG41.50	50	2"	40		

DN = Nominal diameter
k_{vs} = Nominal flow value as per VDI 2173
S_v = Rangeability as per VDI 2173
$\Delta p_{vmax.}$ = Max. permissible differential pressure across the valve's control path, valid for the entire stroke range

Accessories

Electric stem heating element, AC 24 V, required for media below 0 °C : **ASZ6.5**

Ordering

Indicate type.
Example: **VVG41.25**
The fittings must be ordered separately.

Delivery

The valve, actuator and possible fittings are packed and supplied separately.

Equipment combinations

Valves		Actuators [1]						Fittings
		SQX... [2]		SKD...		SKB...		
	H_{100} [mm]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]	Δp_{max} [kPa]	Δp_s [kPa]	Type
VVG41.11								
VVG41.12								
VVG41.13								**ALG15**
VVG41.14								
VVG41.15	20	800	1600	800	1600	800	1600	
VVG41.20			1500					**ALG20**
VVG41.25								**ALG25**
VVG41.32		600	850		1250			**ALG32**
VVG41.40		400	500	700	750			**ALG40**
VVG41.50		250	300	400	450		1200	**ALG50**
Data sheet		**4554**		**4561**		**4564**		

1) Actuators available for delivery:
- AC 24 V / AC 230 V with 3-position signal
- AC 24 V with proportional pos. signal DC 0...10 V or DC 4...20 mA

2) The Δp_{max} and Δp values are valid for the new SQX32... / SQX82... and SQX62 actuators; deliverable from January 1999

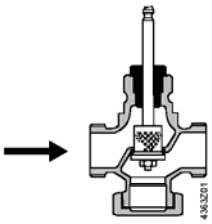
H_{100} = 100% stroke of the valve and the actuator
Δp_{max} = Max. permissible differential pressure across the valve's control path across the entire actuating range of the motorized valve
Δp_s = Maximum permissible differential pressure (closing pressure) at which the motorized valve will close securely against pressure.

Pneumatic actuators

Pneumatic actuators are available on request from your local office.

Mechanical design

Valve cross-section



Guided perforated plug which is integrated in the valve stem.

The seat is attached to the valve body with the aid of special gland material.

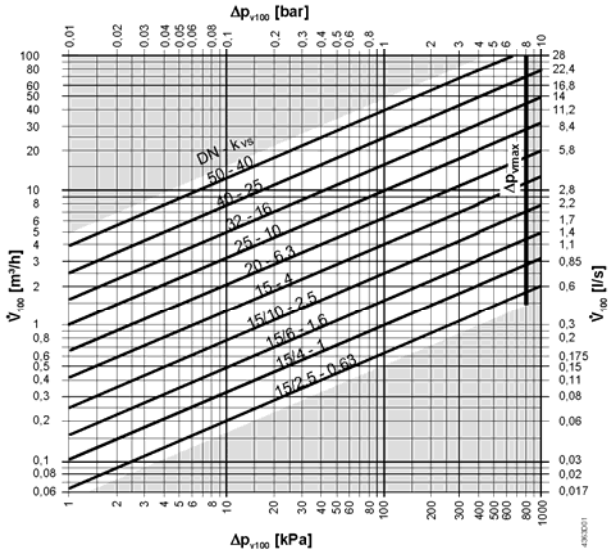
⚠ **The two-port seat valve does not become a three-port valve by removing the blank flange.**

Disposal

The various material types used require that you disassemble the unit and sort the components prior to disposal.

Sizing

Flow diagram



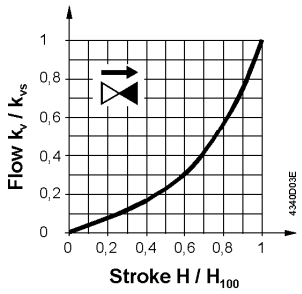
$\Delta p_{vmax.}$ = Maximum permissible differential pressure across the valve's control path, valid for the entire stroke range

Δp_{v100} = Differential pressure across the fully opened valve across the control path at $\dot{V}_{100}$ flow in kPa or in bar

$\dot{V}_{100}$ = Flow in m^3/h or in l/s

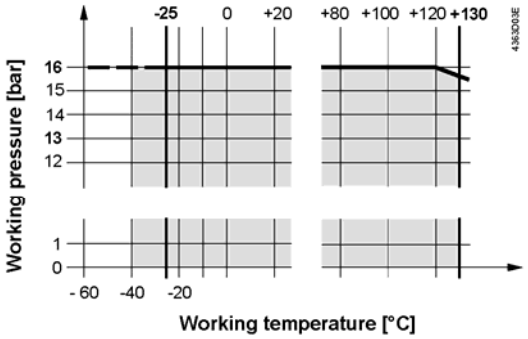
100 kPa = 1 bar ≈ 10 mWG

Valve flow characteristic



Valve flow characteristic
0 ... 30 % ⇒ linear
30 ...100 % ⇒ n_{gl} = 3 as per VDI/ VDE 2173

Working pressure and temperature



Working pressure staged as per ISO 7268 and EN 1333 at operating temperatures of –25 ... +130 °C as per DIN 4747 and DIN 3158.

Notes

Engineering

We recommend installation in the return pipe, as the temperatures in this pipe are lower for applications in heating systems, which in turn, extends the stem sealing gland's life. **Water quality requirements as per VDI 2035.**

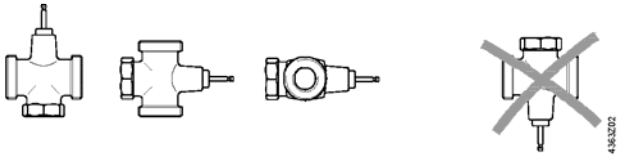
⚠ **In open circuits**, there is a risk of valve plug seizing caused by scale deposits. Thus, use only the most powerful actuator SKB... for these applications. Additionally, periodic actuation (twice or three times per week) must be planned. **Always use** a **strainer** upstream of the valve.
We generally recommend that you install a **strainer even with closed circuits** to increase the valve's functional safety.

⚠ **For media below 0 °C**, use the electric **ASZ6.5 stem heating element** to prevent the valve stem from freezing in the sealing gland. For safety reasons, the stem heating element has been designed for **AC 24 V / 30 W** operating voltage.

Mounting

Both valve and actuator can easily be assembled at the mounting location. Neither special tools nor adjustments are required.
The valve is supplied with mounting instructions.

Mounting positions



Permissible | Not permissible

Direction of flow

When mounting, pay attention to the **valve's flow direction symbol** → .

Commissioning ⚠ **Commission the valve only if the actuator has been mounted correctly.**

Stem retracts: Increasing flow
Stem extends: Decreasing flow

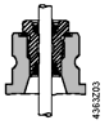
Service ⚠ **For actuator service work: Turn off the pump and the operating voltage, close the shutoff valves, depressurize the pipes and allow them to cool down. Disconnect the electrical connections, where required, from the terminals. Re-commission the valve only if the actuator has been mounted correctly.**

Stem sealing gland

The glands can be exchanged without removing the valve, provided the pipes are depressurized and cooled off and the stem surface is unharmed. If the stem is damaged in the gland range, replace the entire stem-plug-unit. Contact your local office or branch.

Spare parts

Standard version



Replacement for EPDM-O ring sealing gland made from dezincification-free brass, including flat seal made from copper, for cooling water, chilled water, low temperature hot water, high temperature hot water, saturated steam, and brine −25 ... +130 °C
For VVG41 ... DN15 ... DN50 (Stem dia. 10 mm) **4 284 8874 0**

Warranty

The use of third-party actuators expressly voids any warranty claims.

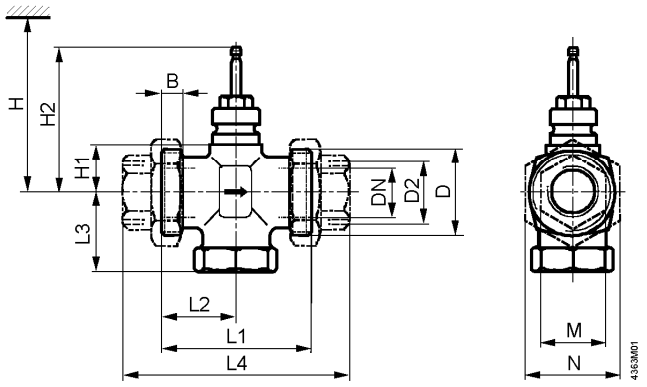
The technical data Δp_{max}, Δp_s, leakage rate, noise level and life apply only when used together with the Landis & Staefa actuators as listed in "Type summary".

Technical data

Function data	PN class	PN16
	Valve flow characteristic 0 ... 30 % 30 ...100 %	 linear n_{gl} = 3 as per VDI / VDE 2173
	Leakage rate	0 ... 0.02 % of k_{vs} value, VDE / VDI 2173
	Permissible pressure	1600 kPa (16 bar), ISO 7268 / EN 1333
	Working pressure	DIN 4747 / DIN 3158 in the range of −25 ... +130 °C
	Threaded connection Valve Fittings	 G...B as per ISO 228/1 Rp... as per ISO 7/1
	Stroke	20 mm
Materials	Valve body	bronze G-CuSn5ZnPb (Rg5) as per DIN 1705
	Seat, plug, and stem	stainless steel
	Sealing gland Gland materials	dezincification-free brass EPDM-O rings
	Fittings ALG...	black malleable cast iron

Dimensions

All dimensions in mm



DN [mm]	B	D	D2	H1	H2	L1	L2	L3	L4	M	N	Weight without fittings [kg]
15	10	G1B	Rp½	26	122.5	100	50	57	146	26	39	1.25
20		G1¼B	Rp¾						148	32	48	1.30
25	14	G1½B	Rp1	34	130.5	105	52,5	59	160	38	54	1.60
32		G2B	Rp1¼					60	168	48	67	2.20
40	15	G2¼B	Rp1½	46	142.5	130	65	73	198	53	73	2.70
50	16	G2¾B	Rp2			150	75	83	222	66	90	3.90

DN [mm]	H		
	SQX...	SKD...	SKB...
15 **20**	> 450	> 525	> 600
25 **32**	> 460	> 535	> 610
40 **50**	> 470	> 545	> 620

DN = Nominal diameter
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, service, etc.
H1 = Dimension from the pipe centre to install Structure the actuator (upper edge)
H2 = Valve in the "Closed" position means that the stem is fully extended

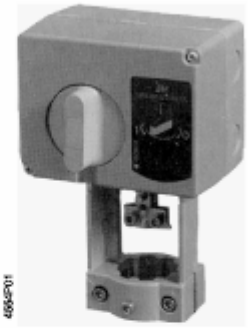
SIEMENS

4 554

SQX32...
SQX82...
SQX62...

Electronic actuators for valves

with 20 mm stroke



- **SQX32...: AC 230 V operating voltage, 3-position signal**
- **SQX82...: AC 24 V operating voltage, 3-position signal**
- **SQX62...: AC 24 V operating voltage, DC 0...10 V and/or 0...1000 Ω or DC 4...20 mA positioning signals**
- **Functional enhancement by means of auxiliary switch and potentiometer**
- **Positioning force 700 N**
- **Stroke 20 mm**
- **For direct valve mounting without additional setting tasks**
- **With manual adjustment and position indication**
- **SQX82...U and SQX62U are UL approved**

Use

To actuate two-port and three-port valves of type series VVF..., VVG..., VPF..., VXF..., and VXG... with 20 mm stroke

- Field of use as per IEC 721-3-3 Class 3K5
- Ambient temperatures: –15 ... +50 °C
- Medium temperature inside the valve: –25 ... +140 °C,
  >140 °C: use SKB... actuators,
  < 0 °C: ASZ6.5 stem heating element required

Functions

SQX32..., SQX82...
3-position signal

The reversible synchronous motor is controlled by a 3-position signal either via terminals Y1 or Y2 and generates the desired stroke by means of a blocking-proof gear train and a gear rack.

- Voltage on Y1: valve stem retracts, through-port opens
- Voltage on Y2: valve stem extends, through-port closes
- No voltage on either Y1 or Y2: valve stem remains in the respective position

SQX62, SQX62U
Positioning signals:
DC 0...10 V and/or
0...1000 Ω or DC 4...20 mA

The SQX62... is either controlled via terminals Y and/or R. The recorded positioning signals control the synchronous motor by means of microprocessor electronics. This motor generates the desired stroke via a blocking-proof gear train and gear rack.

- Positioning signal Y, R increasing: valve stem retracts, through-port opens
- Positioning signal Y, R decreasing: valve stem extends, through-port closes
- Positioning signal Y, R constant: valve stem remains in the respective position

Siemens Building Technologies
Landis & Staefa Division

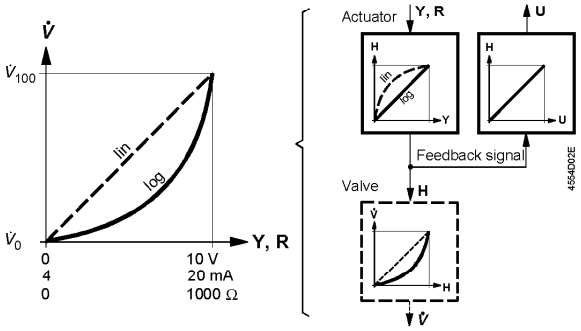
CM1N4554E / 07.1999
1/8

Selection of flow characteristic

Via a slider (on the circuit board below the housing cover), the flow characteristics for the VVF..., VVG..., VXF..., VXG..., and VPF... valves can be changed from "equal percentage" to "linear".
The microprocessor electronics are factory set to generate equal-percentage flow characteristics (log) related to the valve's throughport.

Flow characteristics

Relationship between the DC 0...10 V or DC 4...20 mA positioning signal and the volumetric flow:



Y = DC 0 ... 10 V
R = DC 4 ... 20 mA *or* 0...1000 Ω
U = DC 0 ... 10 V *or* DC 4 ... 20 mA
H = Stroke (valve)

$\dot{V}$ = Air volume
$\dot{V}_{100}$ = Volumetric flow 100 %
$\dot{V}_0$ = Volumetric flow 0 %
log = Equal-percentage valve characteristic
lin = Linear valve characteristic

Calibration stroke

In order to determine the stroke positions 0 % and 100 % in the valve, calibration is required on initial commissioning.
Prerequisites for calibration are mechanical coupling of the actuator SQX62 or SQX62U with a VV... or VX... valve as well as AC 24 V supply.
Pressing button S3 – this button is available only if the housing cover has been removed – starts calibration.
Calibration automatically performs the following steps:
– Actuator moves to "0 stroke" position (valve closed), green LED flashes
– Actuator moves to "100 stroke" position (valve open), green LED flashes
– The measured values are saved in the microprocessor.
  The actuator then moves to the position as indicated by control signals Y or R; the green LED is lit permanently (normal operation).
– Output U is inactive during calibration, i.e., the values correspond to the actual positions only after the green LED is lit permanently.
  Voltage at output U is limited to DC 9.7 ±0.2 V.
  Current at output U is limited to 20 mA ±0.5 mA.

The calibration stroke can be repeated any number of times.

Type summary

Stellantriebe

Standard version:

Type	Operating voltage	Control type (positioning signal)	Runtime [s] Open	Close
SQX32.00	AC 230 V	3-position (floating)	150	150
SQX32.03			35	35
SQX82.00	AC 24 V		150	150
SQX82.03			35	35
SQX62		DC 0...10 V and/or 0...1000 Ω or DC 4...20 mA	35	35

Special, UL approved version:

SQX82.00U	AC 24 V	3-position (floating)	150	150
SQX82.03U			35	35
SQX62U		DC 0...10 V and/or 0...1000 Ω or DC 4...20 mA	35	35

Accessories

	Type	For actuators	Mounting location *)
Auxiliary switch	**ASC9.5**	SQX32..., SQX82..., SQX82...U	1x ASC9.5 **or** 1x ASZ7.4 **or** 1x ASC9.4
Auxiliary switch with potentiometer 1000 Ω	**ASZ7.4**		
Auxiliary switch pair	**ASC9.4**		
Stem heating AC 24 V *)	**ASZ6.5**	SQX32...,SQX82...,SQX62, SQX82...U, SQX62U	1x ASZ6.5

*) Only 1 accessory can be built into the actuator at a time. Exception: ASZ6.5 stem heating which is integrated between the actuator and the valve.

Ordering and delivery

On ordering, indicate the actuator type and, where required, the accessory type; for example: **SQX32.00**

Actuator, valve and accessories are packed and delivered separately and are not mounted on delivery.

Equipment combinations

The **SQX...** electronic actuators allow for actuating two-port and three-port valves of type series VVF..., VVG..., VPF..., VXF..., and VXG... with 20 mm stroke:

Type	DN [mm]	PN [bar]	Data sheet
Two-port valves VV... (control or safety shutoff valves)e)			
VVF21... (Flange)	25...80	6	**4310**
VVF31... (Flange)	25...80	10	**4320**
VVF41... (Flange)	50	16	**4340**
VVG41... (Thread)	15...50	16	**4363**
VVF52... (Flange)	15...40	25	**4373**
Three-port valves VX... (control valves for "mixing" and "diverting" functions)			
VXF21... (Flange)	25...80	6	**4410**
VXF31... (Flange)	25...80	10	**4420**
VXG41... (Thread)	15...50	16	**4463**
VXF41... (Flange)	15...50	16	**4440**
Combination valve VP... (two-port valve with integrated diff. pressure controller)			
VPF52... (Flange)	15...40	25	**4374**

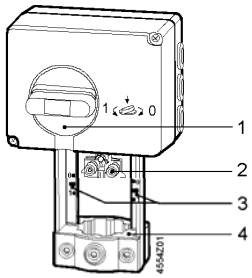
See the associated valve data sheets for permissible differential and close-off pressures Δp_{max} and Δp_s.

Mechanical design

Actuators

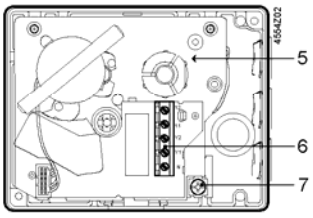
- Maintenance-free, electronic actuator
- Actuators **SQX32..., SQX82...** with reversible synchronous motor
- Actuators **SQX62...** with synchronous motor, controlled by microprocessor electronics
- Blocking-proof gear train with self-lubricating porous bearings
- Force-sensing end switches to protect components from overload
- Selectable flow characteristic: Equal percentage (log) or linear (lin)
- Manual adjustment with automatic reset to control mode
- Slot for auxiliary switch and potentiometer in **SQX32..., SQX82...**
- Stem heating between valve and actuator **SQX32..., SQX82..., SQX62...**
- The actuators **SQX82...U** and **SQX62U** are UL approved

SQX32..., SQX82..., SQX62...:



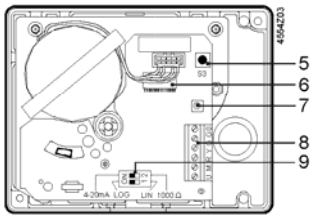
1 Manual adjustment
2 Coupling to valve stem
3 Position indication (0 to 1)
4 Console

SQX32..., SQX82...:



5 Mounting space for auxiliary switch *or* auxiliary switch pair *or* auxiliary switch and potentiometer
6 Terminal strip
7 Bonding screw (for SQX32...)

SQX62:

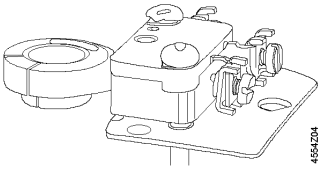


5 Button S3 "Manual calibration"
6 Microprocessor
7 LED, red/green (operating status iindication)
8 Terminal strip
9 DIL switches
No. 1: «**log**» / «lin» *)
No. 2: «**4-20mA**» / «1000Ω» *)

*) bold print = **Factory setting**

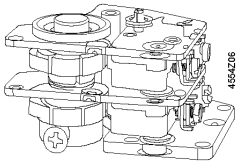
Accessories

Auxiliary switch **ASC9.5**



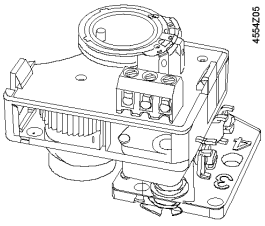
Adjustable switching point

Auxiliary switch pair **ASC9.4.4**



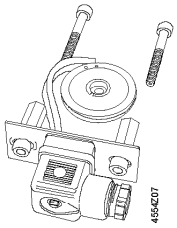
Adjustable switching points

Auxiliary switch with potentiometer **ASZ7.4:**



Adjustable switching point

Stem heating **ASZ6.5:**



for media below 0 °C.
Mounting between valve and actuator

See section "Technical data" for more information.

Disposal

The various material types used require that you disassemble the unit and sort the components prior to disposal.

Engineering notes

Conduct the electric connections in accordance with local regulations on electric installations as well as the unit or connecting diagrams on pages 7 and 8.

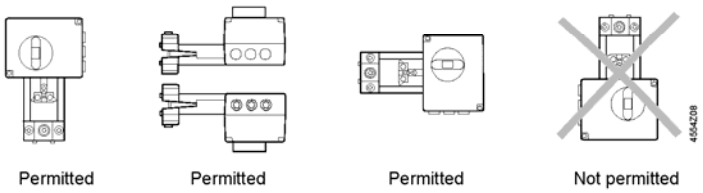
⚠ **Observe all safety-related requirements and restrictions to prevent injuries and damages to goods.**

⚠ **The ASZ6.5 stem heating has a heating output of 30 VA and must keep the valve stem from freezing when used in a cooling range of 0 °C ... –25 °C.**
For this case, do not insulate the actuator console and the valve stem, as air circulation must be ensured. Do not touch the hot parts without prior protective measures to avoid burns.
Non-observance of the above may result in accidents and fires !

Additionally, pay attention to permissible temperatures as listed in sections "Use" and "Technical data". If an auxiliary switch is required, indicate its switching point on the plant schematic.

Mounting notes

Mounting positions

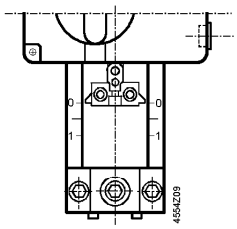


Permitted | Permitted | Permitted | Not permitted

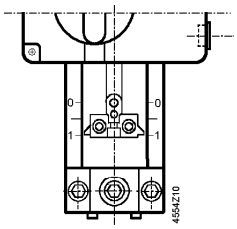
The valve mounting instructions are printed on the rear of the actuator. Accessory instructions are located in the respective accessory's packaging.

Commissioning notes

During commissioning, check the wiring and conduct a functional check. Additionally, check or make the required settings at the auxiliary pair or the auxiliary switch.



Coupling fully retracted



Coupling fully extended

⚠ **If the manual adjustment know is turned clockwise to the end position, the Landis & Staefa valves of type series VVF..., VVG..., VPF..., VXF..., and VXG... are closed (stroke = 0 %). On pending controller signals, the actuator always moves to the preselected position as soon as the manual adjustment button is released.**

For SQX62 and SQX62U only

- **The factory setting for the flow characteristic is "equal percentage = log".**
- **Calibration stroke**
  - On initial connection of the actuator to AC 24 V, trigger the calibration stroke by pressing button S3 (see "Functions"). A special note for initial positioning stroke has been glued to the housing cover.
  - Repeat the calibration stroke when mounting on a new valve a previously calibrated actuator.
  - The calibration stroke can be repeated any number of times.

Maintenance notes

⚠ **For actuator service work:**

- **Turn off the pump and the operating voltage, close the shutoff valves, depressurize the pipes and allow them to cool down. Disconnect the electrical connections from the terminals, where required.**
- **Recommission the actuator only after mounting on a VV... or VX... valve and, for SQX62… actuators, after recalibration.**

Warranty

The technical data (Δp_{max}, Δp_s, leakage rate, noise level and life) apply only when used together with the Landis & Staefa valves as listed in "Equipment combinations".

⚠ **Use with third-party valves expressly voids any warranty claims.**

Technical data

Actuators

Power supply	**Operating voltage**		
	SQX32...	AC 230 V ±15 %	
	SQX82..., SQX82...U	AC 24 V ±20 %	
	SQX62, SQX62U	AC 24 V ±20 %	
	Frequency	50 oder 60 Hz	
	Power consumption		
	SQX32.00, SQX82.00U	3 VA	
	SQX32.03, SQX82.00, SQX82.03, SQX82.03U	6,5 VA	
	SQX62, SQX62U	8 VA	
	Switching capacity of the limit switches	on terminals 11 or 12	
	SQX32...	AC 250 V, 6 A res., 2.5 A ind.	
	SQX82..., SQX82...U	AC 24 V, 5 A res., 0.75 A ind.	
Function dat	**Control type** (positioning signal)		
	SQX32..., SQX82..., SQX82...U	3-position	
	SQX62, SQX62U	DC 0...10 V and/or 0...1000 Ω or DC 4...20 mA (proportional)	
	Runtime	at 50 Hz	at 60 Hz
	SQX32.00, SQX82.00, SQX82.00U	150 s	120 s
	SQX32.03, SQX82.03, SQX82.03U	35 s	30 s
	SQX62, SQX62U	35 s	30 s
	Positioning force	700 N	
	Stroke	20 mm	
Signal inputs SQX62, SQX62U	**Terminal Y***)		
	Voltage	DC 0 ... 10 V (corresponds to 0 ... 100 % stroke)	
	Current	max. 0.1 mA / 5 nF	
	Terminal R *)		
	Current	DC 4...10 V (corresponding to 0...100 % stroke)	
	max. impedance	250 Ω / 5 nF	
	Resistance	0...1000 Ω (corresponds to 0 ... 100 % stroke)	

*) If a DC 4...20 mA control signal is switched to terminal R, terminal Y cannot be used simultaneously!

Signal outputs SQX62, SQX62U	**Terminal U** **)	
	Voltage	DC 0 ... 10 V corresponds to 0 ... 20 mm stroke
	Current	DC 4 ... 20 mA corresp. to 0 ... 20 mm stroke

**) The measuring signal at terminal U corresponds to the stroke position, i.e., at measuring signal DC 0 ... 10 V, the result from a max. selection of the DC 0...10 V control signal at input Y and of the 0...1000 Ω control signal at input R is processed; for the DC 4...20 mA measuring signal, the DC 4...20 mA control signal at input R is processed.

Housing protection	Housing protection	IP 54 EN 60529
	Cable entry glands	
	SQX32..., SQX82..., SQX62	Pg 11 (3x)
	SQX82...U, SQX62U	for standard 1/2" conduit connector (2x) or Pg 16
Environmental conditions	**Medium temperature**, maximum permissible temp. **inside valve**	140 °C
	Operation	IEC 721-3-3
	Climatic conditions	Class 3K5
	Temperature	–15 ... +50 °C
	Humidity	5...95 % r.h.

	Transport	IEC 721-3-22
	Climatic conditions	Class 2K3
	Temperature	–30 ... +65 °C
	Humidity	<95 % r.h.
	Storage	IEC 721-3-1
	Climatic conditions	Class 1K3
	Temperature	–15 ... +50 °C
	Humidity	5...95 % r.h..
Standards	**CE conformity** as per	
	EMC directive	89/336/EEC
	low voltage directive	73/23/EEC
	UL conformity declaration	UL 873
Materials	Actuator housing and console	Die-cast aluminium
	Housing box and manual adjustment knob	Plastic
Dimensions	Actuators	see "Dimensions"
Weight	**Actuators**	
	Weight without packaging	1.5 kg
	With packaging	1.7 kg

Accessories

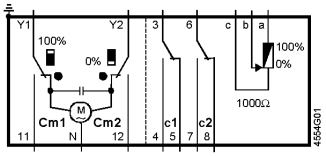
Auxiliary switch ASC9.5 fo SQX32..., SQX82..., SQX82...U	Switching capacity	⎫ ⎪ ⎭
Auxiliary pair ASC9.4 for SQX32..., SQX82..., SQX82...U	Switching output of one auxiliary switch	} AC 250 V, 10 A res., 3 A ind.
Auxiliary switch and potentiometer ASZ7.4 (as one unit) for SQX32..., SQX82..., SQX82...U	Switching output of auxiliary switch Change of overall resistance of the potentiometer at nominal stroke 20 mm	⎫ ⎭ 0...1000 Ω (corresponds to 0 ... 100 % stroke)
Stem heating ASZ6.5 for SQX32..., SQX82..., SQX82...U, SQX62, SQX62U	Operating voltage Power consumption	AC 24 V 30 W

Diagrams

Internal diagrams

SQX32.00, SQX32.03

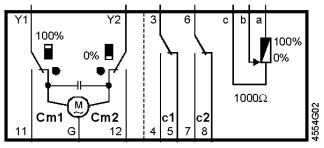
AC 230 V, 3-position



Cm1 End switch
Cm2 End switch
c1 Auxiliary switch ASC9.5
c1 ⎫ ⎧ Auxiliary switch
c2 ⎭ ⎩ Pair ASC9.4
c1 ⎫ ⎧ Auxiliary switch and potentiometer
1000 Ω ⎭ ⎩ (1000 Ω) ASZ7.4

SQX82.00, SQX82.03, SQX82.00U, SQX82.03U

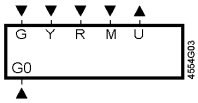
AC 24 V, 3-position



Poss. mounting loc. for SQX32..., SQX82..., SQX82...U:
1 Auxiliary switch ASC9.5 **or**
1 Auxiliary pair ASC9.4 **or**
1 Auxiliary switch and potentiometer (as one unit) ASZ7.4 **and**
1 **Additional** ASZ6.5 stem heating

SQX62, SQX62U

AC 24 V, DC 0...10 V and/or 0...1000 Ω or DC 4...20 mA

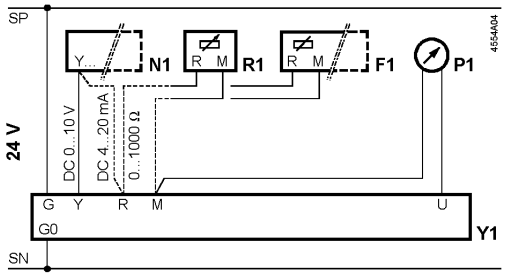


G, G0 AC 24 V operating voltage
G System potential (SP)
G0 System neutral (SN)
Y Control signal input for DC 0...10 V signal
R Control signal for DC 4...20 mA signal or 0...1000 Ω (The signal type is defined at DIL switch no. 2)
M Measuring neutral
U DC 0...10 V measuring signal output at Y = DC 0...10 V or R = 0...1000 Ω (maximum selection of input signals) or DC 4...20 mA measuring signal output at R = DC 4...20 mA

Connection diagram

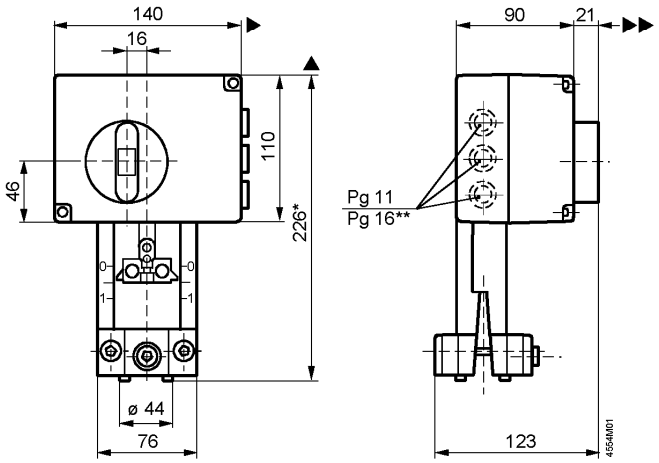
SQX62, SQX62U

The connection diagram shows all possible connections.
The amount and type of connection depends on the plan



Y1 Actuator SQX62...
N1 Controller F1
F1 Frost protection monitor with 0...1000 Ω measuring element (with DIL switch no. 2 in position "1000Ω")
P1 Position indicator
R1 Position transmitter with 0...1000 Ω potentiometer (with DIL switch no. 2 in position "1000Ω")

Dimensions



* Actuator height from valve

** For the SQX82...U and SQX62U actuators, the plug hole diameter corresponds to the cable entry glands Pg16

▲ > 100 mm ⌈ Minimum mounting distance to wall or ceiling,
▲▲ > 200 mm ⌊ Connection, operation, maintenance, etc.

Replaces CE1N4551E
Replaces CE1N4552E
Replaces CE1N4553E

Dimensions in mm

