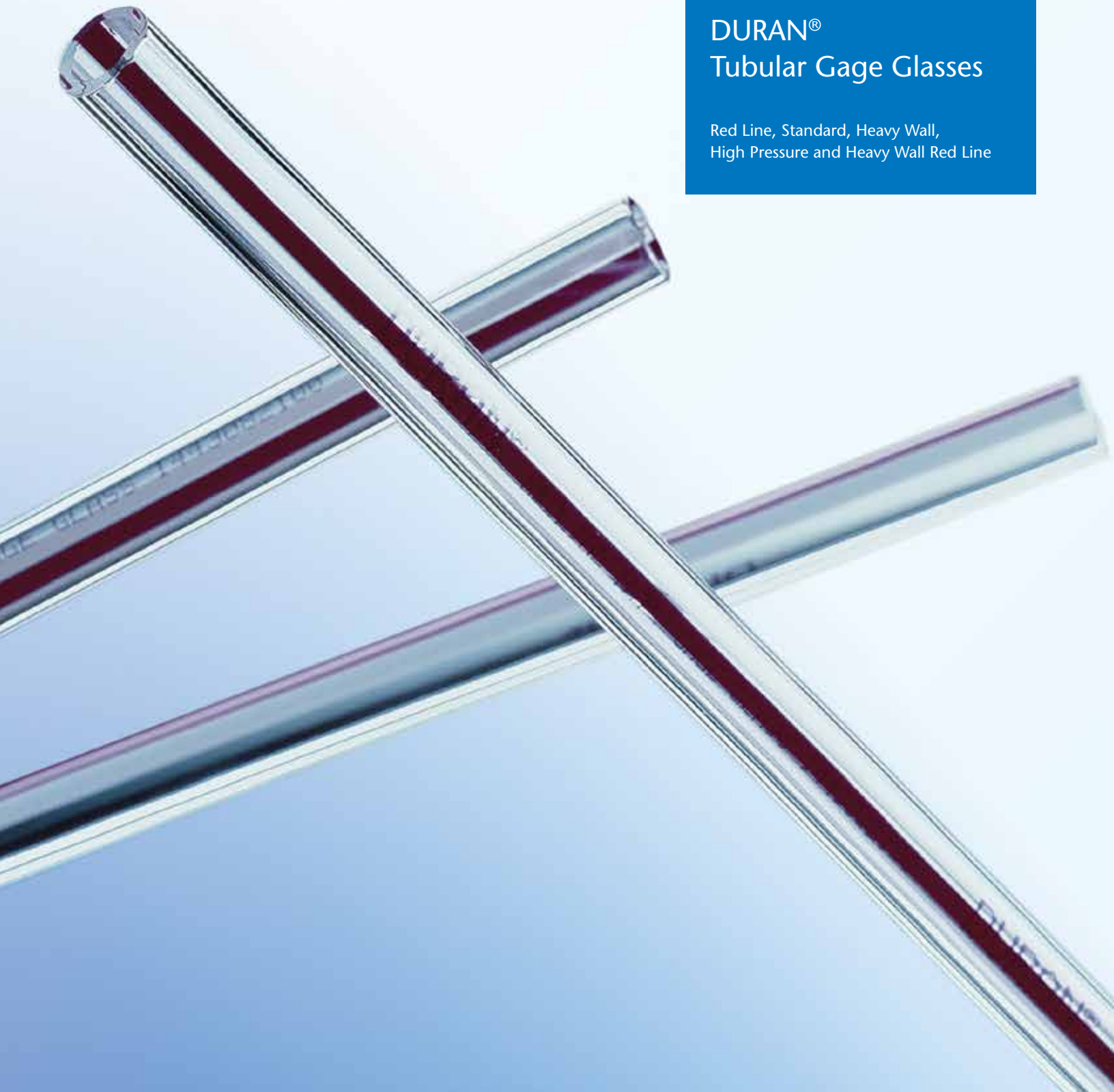


SCHOTT
glass made of ideas

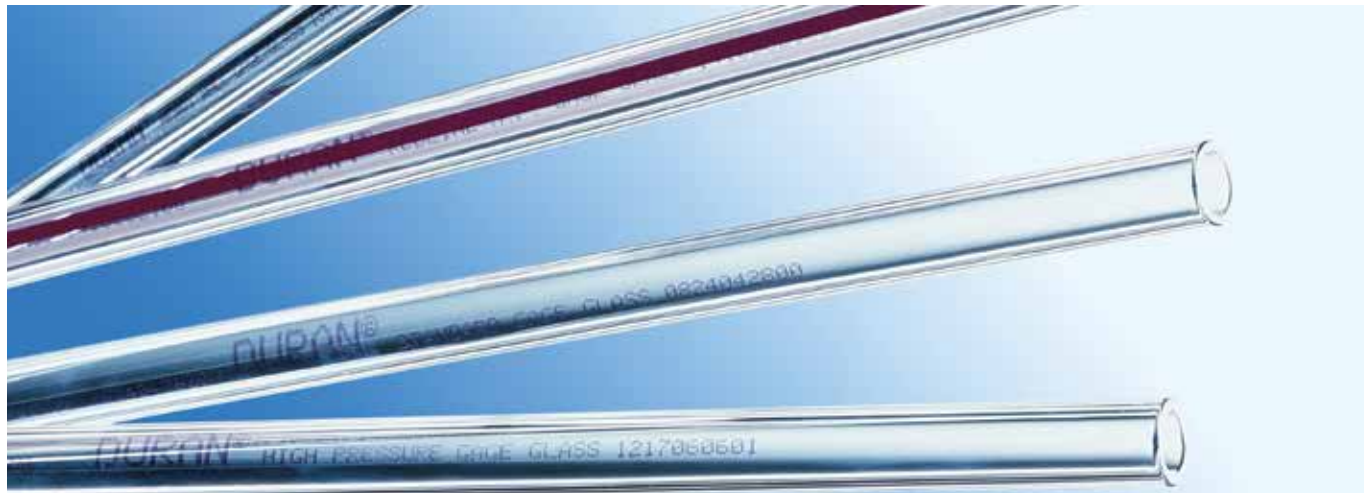
DURAN®
Tubular Gage Glasses

Red Line, Standard, Heavy Wall,
High Pressure and Heavy Wall Red Line



SCHOTT is an international technology group with more than 125 years of experience in the areas of specialty glasses and materials and advanced technologies. With our high-quality products and intelligent solutions, we contribute to our customers' success and make SCHOTT part of everyone's life.

With a production capacity of more than 140,000 tons and production sites in Europe, South America and Asia, SCHOTT's business segment Tubing is one of the world's leading manufacturers of glass tubes, rods and profiles. Approximately 60 glass types are produced in large external diameters and a variety of lengths based on site-overlapping strategies in development, production and quality assurance. SCHOTT Tubing provides customized products and services for international growth markets such as pharmaceuticals and electronics as well as industrial and environmental engineering.



DURAN® Tubular Gage Glasses

Product Information

Many years of experience allow SCHOTT to provide DURAN® tubular gage glasses that are preferred in a wide variety of industrial and commercial applications.

DURAN tubular gage glass is offered as Red Line, Standard, Heavy Wall, High Pressure, and Heavy Wall Red Line.

Diameters range from 1/2" OD to 1 1/2" OD. End finishes may be cut, ground, or fire polished depending on application. Pressure ratings range from 90 psi to 600 psi depending on end finish, diameter, and length required.

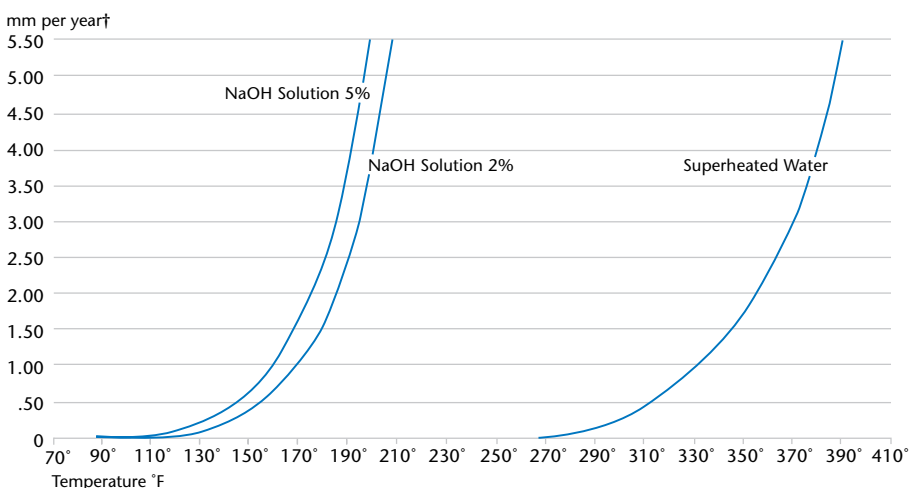
In all cases, before placing a SCHOTT DURAN product into your process, read the "Use and Care" section of this product catalog and the "Use and Care" sheet provided with the product. Pay strict attention to installation and maintenance instructions, maximum use criteria, cautionary messages, and warnings.

To ensure the quality and performance of SCHOTT's tubular gage glasses, look for the DURAN symbol.

Corrosives

The borosilicate glass used to manufacture these products is outstanding for chemical services. Certain limitations, however, must be recognized.

Some materials reduce the useful life of the gage glass by chemical action: e.g. hydrofluoric acid (HF); hot concentrated phosphoric acid; sodium and potassium hydroxides above 125°F; steam or superheated water above 250°F (see graph below).



* Calculated from weight loss over a 24 hour period

Effects of Water and Alkaline Solutions, with Temperature Increase

Alkaline solutions attack glass very slowly at room temperatures, but as temperature is increased over 100°F, the corrosion rate rises rapidly.

Depth of Attack vs. Solution Temperature

The accompanying graph illustrates how the rate of attack increases with temperature and concentration.

Red Line

Applications: Tanks, reservoirs, low pressure boilers

Benefits: The red line shaded with white lines make it easier to read the liquid level

End Finish: Fire polish

DURAN® Red Line

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
1/2" OD +0,-1/32"	8	1084399	12	390	300
	10	1098222	12	370	295
	12	1084432	12	360	295
	14	1084400	12	345	290
	16	1098247	12	335	285
	18	1084401	12	325	280
	20	1084402	12	310	280
5/64" Wall ±1/64"	24	1084434	12	280	270
	30	1084403	12	250	NOT RECOMMENDED
	36	1084435	12	215	NOT RECOMMENDED
	48	1084436	12	175	NOT RECOMMENDED
	60	1084437	12	135	NOT RECOMMENDED
	72 (Max.)	1084438	12	100	NOT RECOMMENDED
5/8" OD +0,-1/32"	8	1084441	12	370	285
	10	1084443	12	345	280
	12	1084448	12	335	280
	14	1084449	12	325	275
	16	1084450	12	315	270
	18	1084453	12	305	265
	20	1084455	12	290	265
	24	1084457	12	265	255
	30	1084458	12	235	NOT RECOMMENDED
	36	1084459	12	205	NOT RECOMMENDED
	48	1084462	12	165	NOT RECOMMENDED
	60	1084439	12	125	NOT RECOMMENDED
3/32" Wall ±1/64"	72 (Max.)	1084440	12	90	NOT RECOMMENDED

* Intermediate lengths are available upon request

** See corrosives, page 3

Red Line

DURAN® Red Line

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
3/4" OD +0,-1/32"	8	1084468	12	360	280
	10	1084469	12	340	275
	12	1084471	12	330	275
	14	1084473	12	320	270
	16	1084475	12	310	265
	18	1084476	12	300	260
	20	1084479	12	285	260
	22	1084480	12	270	250
7/64" Wall ± 1/64"	24	1084481	12	260	250
	30	1084482	12	230	NOT RECOMMENDED
	36	1084483	12	200	NOT RECOMMENDED
	48	1084484	12	160	NOT RECOMMENDED
	60	1084466	12	125	NOT RECOMMENDED
	72 (Max.)	1084467	12	90	NOT RECOMMENDED
7/8" OD +0,-1/32"	30	1098248	12	240	This size not recommended in this service
	36	1086334	12	225	
	48	1086333	12	185	
	72 (Max.)	1084485	12	100	
1" OD +0,-1/32"	24	1098249	12	230	This size not recommended in this service
	30	1086335	12	210	
	36	1098260	12	195	
	48	1086336	12	160	
	60	1098261	12	125	
	72 (Max.)	1086337	12	90	

* Intermediate lengths are available upon request

** See corrosives, page 3

Standard

Applications: Low pressure boilers, restaurant equipment, closed tanks, liquid level gages,
sight flow, film rolls hydraulic equipment

Benefits: Economical, low pressure applications, long service life

End Finish: Saw cut, no firepolish

DURAN® Standard

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
5/8" OD +0,-3/64"	8	1084497	12	210	100
	10	1084498	12	210	100
	12	1084500	12	205	100
	14	1084502	12	200	100
	16	1084503	12	195	100
	18	1084316	12	190	100
	20	1086339	12	185	100
5/64" Wall ±1/64"	24	1084321	12	180	100
	30	1084322	12	175	NOT RECOMMENDED
	36	1084507	12	165	NOT RECOMMENDED
	48	1084508	12	140	NOT RECOMMENDED
	60	1084511	12	120	NOT RECOMMENDED
	72 (Max.)	1084512	12	100	NOT RECOMMENDED
3/4" OD +0,-3/64"	8	1098082	12	210	100
	10	1098099	12	210	100
	12	1084513	12	205	100
	14	1084328	12	200	100
	16	1084514	12	195	100
	17	1084515	12	190	100
	18	1090037	12	190	100
3/32" Wall ±1/64"	20	1098120	12	185	100
	24	1084330	12	180	NOT RECOMMENDED
	30	1098122	12	175	NOT RECOMMENDED
	36	1084516	12	165	NOT RECOMMENDED
	48	1084331	12	140	NOT RECOMMENDED
	60	1084517	12	120	NOT RECOMMENDED
	72 (Max.)	1084518	12	100	NOT RECOMMENDED

* Intermediate lengths are available upon request

** See corrosives, page 3

Heavy Wall

Applications: Crude oil, water or gas flowmeter

Benefits: Permit stable and reliable operation while viewing oil, water or gas flow rates

End Finish: Carborundum saw cut

DURAN® Heavy Wall

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
F5/8" OD	10	1084405	12	600	345
+ 1/64", -3/64"	12	1084410	12	600	340
	14	1098263	12	600	335
	16	1098267	12	600	325
	18	1086330	12	600	320
	20	1084325	12	600	315
3/16" Wall	24	1084407	12	580	300
+3/64", -0	30	1084408	12	550	NOT RECOMMENDED
	36	1084411	12	500	NOT RECOMMENDED
	48 (Max.)	1084412	12	340	NOT RECOMMENDED
3/4" OD	10	1084406	12	600	345
+ 1/64", -3/64"	12	1084416	12	600	340
	14	1086326	12	600	335
	16	1086331	12	600	325
	18	1086332	12	600	320
	20	1086329	12	600	315
7/32" Wall	24	1098270	12	580	300
+1/16", -0	30	1084413	12	550	NOT RECOMMENDED
	36	1084414	12	500	NOT RECOMMENDED
	48 (Max.)	1084415	12	340	NOT RECOMMENDED
7/8" OD	36	1086328	12	500	NOT RECOMMENDED
+ 1/64", -3/64"	48 (Max.)	1086327	12	340	NOT RECOMMENDED
1/4" Wall					
+ 1/16", -0					
1" OD	36	1098271	12	500	NOT RECOMMENDED
+ 1/64", -3/64"	48 (Max.)	1084409	12	340	NOT RECOMMENDED
5/16" Wall					
+ 1/16", -0					

* Intermediate lengths are available upon request

** See corrosives, page 3

High Pressure

Applications: Sight & flow indicators

Benefits: Visual indication of liquid flow, contamination or discoloration of liquid, metering a constant rate of flow through a fixed port

End Finish: Saw cut and fire-polished

DURAN® High Pressure

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
1/2" OD +0, - 1/32"	8	1084333	12	460	340
	10	1084335	12	445	335
	12	1084337	12	435	325
	14	1084338	12	415	315
	16	1086313	12	400	300
	18	1084339	12	385	295
	20	1086314	12	375	285
5/64" Wall ± 1/64"	24	1084340	12	340	270
	30	1086315	12	295	NOT RECOMMENDED
	36	1084341	12	260	NOT RECOMMENDED
	48	1084342	12	205	NOT RECOMMENDED
	60	1084343	12	155	NOT RECOMMENDED
	72	1084344	12	110	NOT RECOMMENDED
5/8" OD ± 0,-1/32"	8	1084347	12	435	320
	10	1084351	12	420	315
	12	1084356	12	410	305
	14	1084358	12	390	295
	16	1084362	12	375	285
	18	1084363	12	360	280
	20	1084364	12	350	270
3/32" Wall ± 1/64"	24	1084366	12	320	255
	30	1084367	12	280	NOT RECOMMENDED
	36	1084369	12	245	NOT RECOMMENDED
	48	1084371	12	195	NOT RECOMMENDED
	60	1084372	12	150	NOT RECOMMENDED
	72	1084373	12	100	NOT RECOMMENDED

* Intermediate lengths are available upon request

** See corrosives, page 3

High Pressure

DURAN® High Pressure

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
3/4" OD	8	1084376	12	425	315
± 0, -1/32"	10	1086316	12	410	310
	12	1084377	12	400	300
	14	1084379	12	385	290
	16	1084381	12	370	280
	18	1084382	12	355	275
	20	1084383	12	345	265
7/64" Wall	24	1084385	12	315	250
± 1/64"	30	1084386	12	275	NOT RECOMMENDED
	36	1084387	12	240	NOT RECOMMENDED
	48	1084388	12	190	NOT RECOMMENDED
	60	1084389	12	145	NOT RECOMMENDED
	72	1084390	12	100	NOT RECOMMENDED
7/8" OD	30	1098161	12	285	This size not recommended in this service
+0, - 1/32"	48	1086317	12	210	
1/8" Wall	60	1086312	12	160	
± 1/32"	72	1086319	12	110	
1" OD	8	1098162	12	345	This size not recommended in this service
+0, - 1/32"	10	1098164	12	335	
1/8" Wall	12	1098167	12	325	
± 1/32"	24	1084393	12	285	
	36	1098168	12	240	
	48	1084391	12	190	
	60	1086320	12	145	
	72	1084392	12	100	

* Intermediate lengths are available upon request

** See corrosives, page 3

High Pressure

DURAN® High Pressure

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
1 1/8" OD	24	1098170	12	235	This size is not recommended in this service
+0, -3/64"	36	1098176	12	200	
1/8" Wall	48	1098177	12	180	
± 1/32"	60	1086318	12	150	
	72	1086311	12	130	
1 1/4" OD	8	1086321	12	240	This size is not recommended in this service
+0, -3/64"	10	1086308	12	235	
1/8" Wall	24	1098178	12	210	
± 1/32"	30	1084397	12	200	
	36	1084305	12	180	
	48	1086322	12	160	
	60	1086324	12	135	
	72	1086323	12	115	
1 1/2" OD	8	1084398	12	210	This size is not recommended in this service
+0, -3/64"	12	1098198	12	200	
1/8" Wall	24	1098199	12	185	
± 1/32"	36	1098220	12	160	
	48	1086325	12	140	
	60	1086309	12	120	
	72	1086310	12	100	

* Intermediate lengths are available upon request

** See corrosives, page 3

Heavy Wall Red Line

Applications: Crude oil, water or gas flowmeter

Benefits: Permit stable and reliable operation with better viewing of oil, water or gas flow rates.
The red line shaded with white lines make it easier to read the liquid level

End Finish: Carborundum saw cut

DURAN® Heavy Wall Red Line

Maximum Recommended
Working Pressure, psi

Size	Length* In.	New Code	Pcs. Per Case	Temperatures Up to 150°F No Corrosion**	Steam Boiler Service Up To 425°F
5/8" OD	12	1084529	12	600	340
+ 1/64", - 3/64"	16	1084521	12	600	325
	20	1084318	12	600	315
	24	1084428	12	580	300
	30	1084544	12	550	NOT RECOMMENDED
	36	1084536	12	500	NOT RECOMMENDED
3/16" Wall	48	1084542	12	340	NOT RECOMMENDED
3/4" OD	12	1084319	12	600	340
+ 1/64", - 3/64"	16	1084545	12	600	325
	20	1084523	12	600	315
	24	1084525	12	580	300
	30	1084320	12	550	NOT RECOMMENDED
	36	1084530	12	500	NOT RECOMMENDED
7/32" Wall	48	1084537	12	340	NOT RECOMMENDED

* Intermediate lengths are available upon request

** See corrosives, page 3

Use and Care

Maintenance

Examine the gage glass regularly for any signs of clouding, scratching, erosion, or corrosion. In new processes, the glass should be inspected daily until the need for replacement becomes apparent. This will help establish the routine inspection and routine replacement cycles.

Cleaning

Keep gage glass clean using non-abrasive commercial glass cleaners. Where regular cleaners do not seem to work, use dilute acids such as Hydrochloric (muriatic) acid. Always observe the safety rules when handling hazardous cleaning solutions. Never use wire brushes, metal scrapers, or harsh abrasives, which could scratch the glass.

Inspection

Scratches, corrosion, chips, surface flaws, or nicks on the surface or edges weaken the gage glass. To examine for these, shine a very bright concentrated light ("Burton Lite" or powerful flashlight) at about 45° angle. Anything which glistens and catches the fingernail or any star-shaped or crescent-shaped mark which glistens, is cause for replacement. Any gage glass which appears cloudy or roughened and will not respond to cleaning procedures should be replaced.

Storing

Keep gage glasses in original packaging until ready to install.

Handling

Avoid bumping, chipping, or scratching gage glass. Any glass-to-glass contact can cause scratches and must be avoided.

Installation

Always follow tubular gage manufacturer's recommended procedures for glass replacement.

Before installing a gage glass, remove all deposits from the seal contact surfaces of the gland nut and the gland (where used). Check sealing surfaces for cleanliness and smoothness. Once a gage glass has been removed from its mounting, regardless of the reason for its removal, discard the glass and replace with a new piece.

Always use new packing, seals, and/or O-rings (if required) when replacing a tubular gage glass. Used packing, seals, and O-rings will not properly support the gage glass or provide the proper pressure seal without stressing the glass.

Warnings

NOTICE: Read these warnings & instructions before installing or replacing gage glass.

Warnings

- Improper installation or maintenance of tubular glass can cause immediate or delayed glass breakage resulting in bodily injury. To avoid breakage observe the following Do's and Do Not's and Use and Care Instructions, as well as tubular gage manufacturer's instructions.
- If a gage glass breaks, contained substances can be released and glass can be blown out of the unit with great force. Always wear safety glasses when looking towards a gage or working on a gage glass assembly. Guard against the possibility of fire and explosion.
- Protect glass from impact, scratches, other surface damage and sudden temperature changes. These can weaken or stress the glass and lead to breakage.

Do's and Do Not's

FAILURE TO OBSERVE THE FOLLOWING DO's and DO NOT's CAN RESULT IN GLASS BREAKAGE AND ITS EXPLOSIVE RELEASE OF PRESSURIZED SYSTEM CONTENTS AND FLYING GLASS PARTICLES.

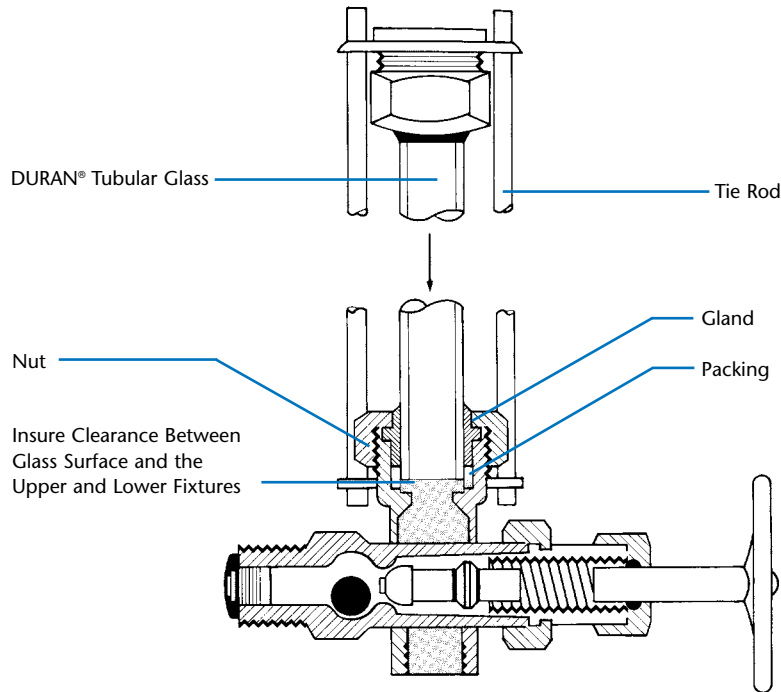
Do's

- DO inspect the gage glass daily, keeping maintenance records, and conduct routine replacements.
- DO install protective guards where necessary to protect personnel.
- DO protect the outside of the gage glass from sudden temperature changes, such as drafts, water spray, etc.
- DO remove all deposits from the seal areas, the glands nuts, glands (where used) and use new packing before installing a tubular gage glass.
- DO examine gage glass for damage and seals for hard deposits and tears.
- DO verify that the tubular gage glass, gland, nuts, packing, etc. are the correct size and type before installing.
- DO ensure that system is protected by safety shut-off system (e.g. safety ball, check).

Do Not's

- DO NOT work on any gage until you have carefully read these warnings & instructions.
- DO NOT reuse any tubular glass, packing, or seals.
- DO NOT use glass that is scratched, chipped, or otherwise damaged. Used glasses may contain damage and are poor safety risks.
- DO NOT exceed the glass or gage manufacturer's recommended working pressures or maximum recommended gage glass length.
- DO NOT bump, impact, or scratch the glass.
- DO NOT tighten gland nut and packing beyond gage manufacturer's recommendations.
- DO NOT operate gages unless gage valve sets are equipped with drain vent and safety ball check.
- DO NOT attempt to clean glass while the unit is in operation. Cleaning should be done without removing the gage glass.
- DO NOT attempt to inspect the glass, to adjust tie rods, packing nuts or glands, to inspect or tighten other fittings without isolating the gage from the pressure vessel and opening the drain vent.
- DO NOT weld, impact, or sandblast in the gage glass area without protecting the glass.
- DO NOT have glass-to-metal contact.
- DO NOT subject gage glass to bending or twisting stress.
- DO NOT allow the gage glass to contact the bottom of the packing gland.

Installation View



1. Hold fittings rigidly to prevent misalignment, which can cause severe bending stresses in the glass, when packing nuts are tightened.
2. Provide metal washers so nuts can be tightened without twisting packing or tube.
3. Provide positive, but not excessive, clearance between glass, packing nuts, and bearing washers.
4. Keep glass short enough to allow for expansion.
5. Provide positive clearance between the ends of the gage glass and the metal fittings. Glass-to-metal contact will keep the gage glass from expanding and cause breakage.
6. Tighten packing nuts enough to prevent leakage, but not so much that you hinder expansion and contraction. Follow gage manufacturer's recommendations.
7. Generally, you can use cylindrical or conical rubber packings for LOW and MEDIUM pressures. HIGHER pressures and HIGH temperatures may require specialized packings. In all cases you should follow the recommendations of the gage manufacturer.

Warranty

SCHOTT warrants that its Tubular Gage Glasses conform to its specifications and are free from defects in material and workmanship. This warranty does not apply to glass that has been annealed, tempered, cut, ground or altered by others.

This warranty is in lieu of all other warranties, and SCHOTT specifically excludes any implied warranty of merchantability of fitness for a particular purpose. SCHOTT's sole obligation under this warranty shall be to provide replacement glasses, and in no event shall SCHOTT be responsible for incidental or consequential damage.

Services

At SCHOTT, skilled engineers and designers work with you to develop component parts or complete products from glass. As with all SCHOTT products, we offer the experience that comes with over a century of making glass more useful.

To ensure the quality and performance of SCHOTT's tubular gage glasses, look for the DURAN® symbol.

Special Finishing and Fabrication

Many of SCHOTT's Industrial Supplies Distributors are equipped to fabricate special shapes, drill holes, cut tubing, grind and polish, or finish glass to tolerances other than those shown in this catalog. For additional information and quotations on special requirements, contact your local SCHOTT Industrial Supplies Distributor or:

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