



HOSE USE, CARE AND MAINTENANCE

Goodall[®] INTELLIGENT HOSE TECHNOLOGY

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PART 1

Introduction

Introduction

Information and data contained in this catalogue is intended to provide general assistance and overview with respect to hose use, care and maintenance. Each application may present unique circumstances that necessitate changes or modifications to the information and data contained in this catalogue. For additional resources, consult the references listed in this catalogue. See also terms and conditions of sale associated with the sale of Goodall products.



PART 2

STAMPED

STAMPED

S Size

The hose inside diameter (I.D.) and length required to meet the application requirements. (i.e. 2" x 20 ft.).

T Temperature

Maximum temperature of product conveyed through the hose assembly (i.e. 200 °F).

A Application

Describe the actual use of the hose (i.e. Ship-to-Shore unloading, in-plant chemical, tank truck unloading, etc.). The concentration of the product(s) must also be known.

M Material

Air, water, the specific chemical, product, Conveyed or material conveyed (i.e. compressed air).

P Pressure

The pressure or vacuum at which the material is being conveyed through the hose assembly (i.e. 80 PSI).

E Ends

Type of end connections required to meet the application and be compatible with material conveyed (i.e. Boss Male x Boss Ground Joint).

D Delivery

Date product is required (i.e. Friday, June 16, 2014).

Once the information in the acronym "STAMPED" referenced above is obtained, it is essential that a hose and coupling combination meet all of the "STAMPED" requirements as recommended by the manufacturer of the various products incorporated within the hose assembly. "Always use the printed information to insure the accuracy of any recommendation."

Do not exceed the printed, recommended service criteria.

All hose and hose assemblies have a finite life. Proper care, inspection and testing will prolong the service life and reduce the incidence of failures in service. Service life of hoses cannot be predicted because service conditions vary.

PART 3

General instructions for
hose use, care and
maintenance

GENERAL INSTRUCTIONS FOR HOSE USE, CARE AND MAINTENANCE

This information is based on recognized industry recommendations from sources such as NAHAD, RMA, etc. and the experience gained by the manufacturers of Goodall Products ("Goodall") over many years. It is intended to serve as a guide for the Use, Care, and Maintenance of Hose and Hose Assemblies.

Historically, Goodall's customers have requested information pertaining to use, care, and maintenance of Goodall hose and hose assemblies. As a result, Goodall has assembled this resource to improve users' understanding. This information should be made available to all users of Goodall's hose and hose assemblies.

Typically, hoses are designed to transfer product(s) and to operate in a dynamic work environment. This operation can present a serious safety hazard if safe operating procedures are not followed!

Not all hose and couplings are designed for the same uses and it is critical for the user to understand how and what is important for the safe and correct use of a hose assembly. It is always necessary to know the conditions and application concerning the intended service of any particular hose before you use or request a hose.

Should you have any questions on any topic covered in this, contact your local distributor of Goodall hose.

End users desire to maximize the safety and service life of a product. To accomplish this, the user has to maintain specific care during use of the hose assembly to insure continued safe operations.

PART 4

Common operator
requirements for
a hose assembly

COMMON OPERATOR REQUIREMENTS FOR A HOSE ASSEMBLY

1. Working Pressure (W.P.) should never be exceeded.
2. Always rate the Working Pressure of the hose assembly by the lowest rated component (hose W.P. or coupling W.P. attachment method, whichever is lowest).
3. Only use the hose assembly for the service marked on the product or for those services recommended in print. Contact your local Goodall distributor about other applications before the hose assembly is put into use.
4. Have a Hose Inspection and Test Plan to insure unsafe hose and/or worn, damaged or corroded couplings are removed from service.
5. Test all hose assemblies as required to insure the assembly is safe for use. (Use manufacturers, RMA, ASTM, NAHAD, other industry associations or regulatory bodies' recommendations for pressure testing along with these recommendations.)
6. Train all individuals using any Goodall hose as to the conditions associated with an unsafe hose. The operator is the last line of defense against spills and injuries. Instruct your employees that: "When in doubt, Remove the Hose From Service!"
7. Always use the appropriate Chemical Resistance Charts to verify that the chemical or product transferred is compatible with the hose tube. "Remember, the temperature and concentration of the chemical/product conveyed must not exceed the manufacturer's recommendations." Employees using chemical hose should always wear appropriate PPE (safety protection) to guard against accidental spills and splashing. Some examples of PPE are: safety clothing, hard hat, eye protection, protective wear, boots, gloves, or other safety protection as dictated by operating conditions.
8. Always use a coupling made from material suitable for the application and the product conveyed. Refer to manufacturer's recommendations.
9. For hoses coupled with adjustable clamps, re-tighten clamps as recommended by the manufacturer and use the manufacturer's recommended torque values. It is always good practice to inspect clamps before use. If the clamps can no longer be tightened, cut off the coupling, thoroughly externally and internally inspect the hose and couplings then re-attach a coupling on another part of the hose per the coupling manufacturer's recommendations.
10. It is recommended that recoupled hose be hydrostatically tested prior to being returned to service.
11. Before each use of the hose assembly, always check the coupling. If there is a question concerning slippage, remove hose from service.

PART 5

General instructions
for hose and coupling
inspection

GENERAL INSTRUCTIONS FOR HOSE AND COUPLING INSPECTION

All hose should be internally and externally inspected prior to each use and hydrostatically tested periodically. All hose should be hydrostatically tested to 1.5 or 2.0 times the working pressure (as recommended by the manufacturer or to appropriate industry standards). Frequency of the testing is determined based on many factors including, but not limited to: the conditions to which the assembly is subjected, time in service, frequency of use, etc.. Prior to inspection, the hose must be depressurized and laid out straight.

All inspections are to be performed by personnel properly trained on the information detailed in this and other industry and manufacturer's literature prior to performing any inspection. See reference information.

Hoses and its component parts, should be examined for the conditions listed below. If any of the conditions are present, immediately remove the hose from service.

External Inspection- Hose

Inspect cover for cuts, gouges, worn spots or any other condition that exposes the reinforcement. Inspect cover for smashed, kinked, bulges, blisters or soft spots.

Inspect hose for 18" behind each coupling for any evidence of leaking, basketing, kinking, bulges, soft spots or cover cracking exposing the reinforcement.

External Inspection- Couplings

Coupling movement or slippage which could be manifested by misalignment of the coupling with the hose.

Damaged coupling or coupling parts.

Cracked, damaged or badly corroded couplings.

Other signs of significant deterioration.

Loose, missing or damaged bands, clamps, shields or guards.

Internal Inspection- Hose

Inspect the hose bore on each end with a flashlight or other suitable device for any evidence of blisters, carcass separation, tube cracks, excessive tube wear or swelling (where the hose inside diameter is smaller than the original hose Id).

PART 6

General instructions
for hose hydrostatic
testing and inspection

GENERAL INSTRUCTIONS FOR HOSE HYDROSTATIC TESTING AND INSPECTION

A hydrostatic test should be made at periodic intervals to determine if a hose is suitable for continued service. This testing is to be performed in an environment that protects personnel and property from any unexpected failure.

The periodic hydrostatic tests should be performed for a minimum of five minutes at 1.5 or 2.0 the recommended working pressure of the hose. Contact the manufacturer/supplier for the recommended test pressure. During the hydrostatic test, the hose should be straight, not coiled or in a kinked position. Water is the recommended test medium unless some other medium is required by the manufacturer or customer. A regular schedule for testing should be followed and inspection/testing records maintained.

SAFETY WARNING:

Before conducting any pressure tests on hose, provisions must be made to ensure the safety of the personnel performing the tests and to prevent any possible damage to property. Only trained personnel using proper tools and adequate PPE should conduct any pressure test. It is recommended that testing only be performed by trained, competent personnel using potable water. Air or any other compressible gas should only be used as the test media under special circumstances using proper safety equipment and industry / manufacturer's recommended processes. Contact your supplier prior to testing with any gas including air. Because of the explosive action of using any gas, a failure might result in damage to property and/or serious bodily injury.

General Hydrostatic Test Procedure

Once proper end connections have been chosen and attached to the hose assembly, the hose is to be laid in a straight position. Test fittings must be rated at least at the same pressure as the maximum pressure to be applied.

Mark immediately behind both fittings prior to pressurization in order to determine whether there is any coupling slippage. Connect the hose to be tested to the supply hose or manifold.

Caution: When tightening connections, never place wrenches on sleeves or ferrules. Always place wrenches on hex nuts.

Elevate the exhaust end of the assembly and fill hose minimum water pressure. Continue to elevate exhaust end until all the air has been removed from inside the hose. Once all the air is exhausted, close the exhaust valve and replace hose in the straight position. Restraints should be connected at this time.

Caution: It is critical that all the air in the hose has been exhausted before testing begins.

GENERAL INSTRUCTIONS FOR HOSE HYDROSTATIC TESTING AND INSPECTION

After closing the exhaust valve, check all connections to insure there is no leaking. Once all leaking has been eliminated, raise pressure to the hose's rated working pressure and hold. After approximately one minute, visually inspect hose and couplings for any leaking or unusual conditions. If any unusual conditions appear contact the appropriate person for disposition of the hose.

Hold pressure at the working pressure long enough to check for leaks and perform any measurements required. Once this is completed and the hose assembly shows no signs of leaking, raise pressure to the test pressure and hold for five (5) minutes.

Again, inspect assembly for any leaks and any excessive coupling movement. If any leaking of the assembly occurs, immediately discontinue test and mark hose with appropriate information for disposition later.

After test pressure has been maintained for a minimum of five (5) minutes and the hose assembly has not shown any signs of leaking or coupling movement, release pressure gradually until it is reduced to 0. Once all pressure has been released, test caps must be removed, all water drained from the hose and the ends of the hose couplings protected in a suitable manner (i.e. protective caps, taping, etc.).

PART 7

General instructions for
proper hose storage

GENERAL INSTRUCTIONS FOR PROPER HOSE STORAGE

Rubber hose products in storage can be affected adversely by: temperature extremes, humidity, ozone, sunlight, oils, solvents, direct light from fluorescent or mercury lamps, corrosive liquids and fumes, insects, rodents and radioactive materials. Proper storage will maximize hose shelf life while unusually long storage could affect the performance of the product. If there is any doubt about the serviceability of the product contact your supplier.

The appropriate method for storing hose depends upon many factors including: hose Id and length, the quantity to be stored, and its packaging. Care should be taken when stacking hose, as its weight can crush hose at the bottom of the stack. Hose which is shipped in coils or bales should be stored so that the coils are in a horizontal plane.

Whenever feasible, rubber hose products should be stored in their original shipping containers, especially any container that provides some protection against the deteriorating conditions described above.

The ideal temperature for the storage of rubber products ranges from 50°F to 70°F (10-21°C) with a maximum limit of 100°F (38°C). If stored below 32°F (0°C), most rubber products will become rigid requiring warming before being processed or placed in service.

To avoid the adverse effects of high ozone concentration, rubber hose products should not be stored near electrical equipment that may generate ozone or be stored for any lengthy period in geographical areas of known high ozone concentration. Exposure to direct or reflected sun-light, even through windows, should also be avoided. Uncovered hose should not be stored under fluorescent or mercury lamps which generate light waves harmful to rubber.

Storage areas should be relatively cool and dark, and free of dampness and mildew. Items should be stored on a first-in, first-out basis, since even under the best of conditions, an unusually long shelf life could deteriorate certain rubber products.

PART 8

Do's and don'ts of hose
care and use

DO'S OF HOSE CARE AND USE

Hose is a very vulnerable link in most process and transfer applications. It handles valuable and potentially dangerous materials. Hose failures can be expensive in terms of lost production, ruined equipment, and, most important, personal injuries.

For this reason, hose is carefully designed and built to do a specific job safely and economically. Yet, unfortunately, the years of research and development invested in hose construction can be affected by improper storage, misuse, and other abuse by the hose user, warehouseman, and other work personnel. Careful observation of the following points will improve service, safety, and economy from the hose you use.

- DO** Use hose designed and recommended for the service intended. Your trained representative will gladly aid in helping select the best hose for the service and make suggestions to prolong its service life on the job.
- DO** Specify best-quality hose where maximum safety and performance are desired.
- DO** Make sure hose is easily identifiable as to type and use. Where dangerous misuse may possibly occur, use different fittings or connections.
- DO** Make sure hose is the correct length for the job intended so that it is not stressed unnecessarily, or exposed to damage because it can't be kept out of the way of passing traffic.
- DO** Set up inspections before each use so that damaged or worn out hose or couplings can be replaced before either contributes to an accident.
- DO** Attach hose, using appropriate elbows and nipples, so that its operation (including its own weight) will not cause it to bend sharply at the coupling.
- DO** Avoid subjecting hose to damage by vehicles, falling rocks, or other objects. It is easy to install protective covers or to run hose through lengths of pipe.
- DO** Check manufacturers' Chemical Resistance Charts to insure the hose will transfer the chemical before it is put in the hose. The S.T.A.M.P.E.D information must be known to properly determine compatibility.
- DO** Wear appropriate PPE (Personal Protection Equipment) for the application.
- DO** Hydrostatically test hoses periodically.
- DO** Train employees on how to inspect a hose before each use to insure it is safe to use. "When in doubt, remove from service!" Error on the side of safety!
- DO** Remove a hose assembly from service whenever there is doubt concerning its safe operation.
- DO** Store hose in a cool, dry, dark, and clean place.

DO'S AND DON'TS OF HOSE CARE AND USE

- DO** Store hose in a flat coil. Be sure no kinks are left in the coil. Lay it on the floor, a shelf, or a table. Store long length hose on a reel. If hose is non-reelable, store it in straight lengths.
- DO** Use hoses in a well ventilated area. Certain media such as Anhydrous Ammonia, LPG, etc. will permeate through the hose and can displace breathable air in a confined space.
- DO** Protect hose from ozone (O₃), the active form of oxygen which is more prevalent in the atmosphere than many people think. Store away from electrical or ozone generating equipment, preferably in the dark. Paper, wood, and rags are good O₃ absorbers. Original packaging should be maintained when long storage is involved.
- DO** Use "wipchecks".

DON'TS OF HOSE CARE AND USE

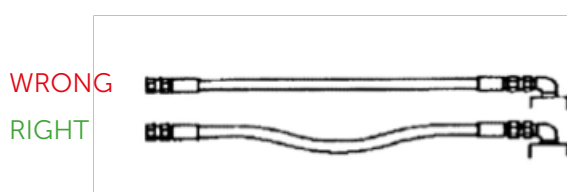
- DON'T** Crush hose or kink it. Also avoid repeated bending which may eventually break the reinforcement.
- DON'T** Hang hose on a nail, peg, wall hook, or anything else that will bend it sharply. Kinking, especially prolonged, can lead to hose failure.
- DON'T** Substitute hose types. Consult your supplier or his representative for a recommendation where an alternate must be found. For example, using a hose not made for high pressure service as a substitute for compressed air could lead to dangerous failure and injury.
- DON'T** Let direct sunlight shine on rubber hose for prolonged periods. Sunlight will deteriorate some types of rubber hose covers.
- DON'T** Assume that all hose is oil proof. It is good policy to keep grease and oil from all hose, or else to clean immediately after contact with such materials.
- DON'T** Store hose after use without first rinsing, draining, and drying out the tube if it has carried any substance that might ultimately cause rubber deterioration.
- DON'T** Use a hose if it has any reinforcement exposed through the cover due to cuts, gouges, wear, or just prolonged use.
- DON'T** Re-couple hose unless you are knowledgeable about the correct methods to re-couple.
- DON'T** Exceed the working pressure for any reason.
- DON'T** Place heavy objects on stored hose or stack the hose so that bottom pieces are distorted.
- DON'T** Use damaged or worn fittings. Check to see if coupling is loose or has moved, has worn threads, worn gasket, or is corroded. Successful hydro-testing will help verify the integrity of the coupling.
- DON'T** Bend hose beyond its minimum bend radius or with a kink when installing or using hose. Sharp bends immediately behind the coupling will reduce service life.
- DON'T** Use a hose outside the temperature limits as given by the manufacturer.
- DON'T** Install a hose with a twist or such that flexing/bending occurs in more than one plane.

PART 9

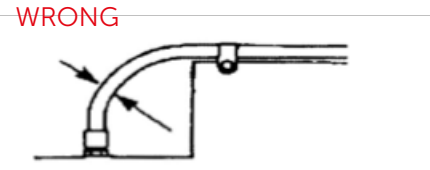
Correct assembly
installation

CORRECT ASSEMBLY INSTALLATION

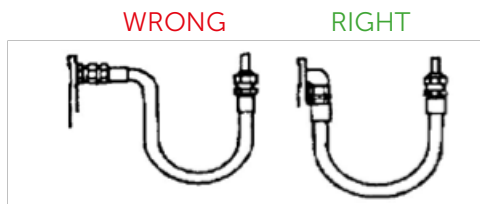
Satisfactory performance and appearance depend upon proper hose installation. Excessive length destroys the trim appearance of an installation and adds unnecessarily to the cost of contraction will cause poor power transmission and shorten the life of the hose.



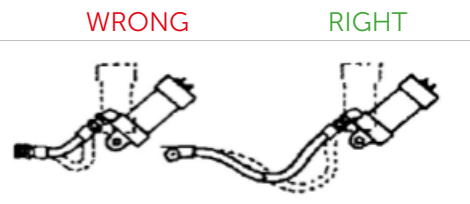
Since hose may change in length under the surge of high pressure, provide sufficient slack for expansion



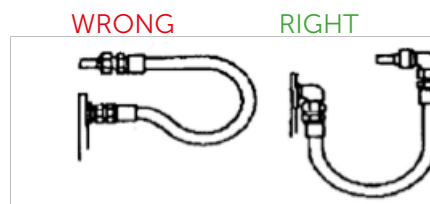
Due to changes in length when hose is pressurized, do not clamp at bends so curves absorb changes. Do not clamp high and low



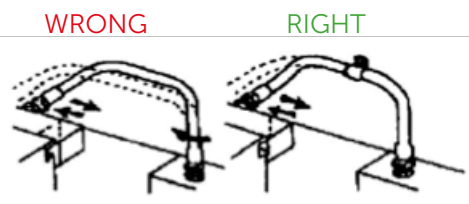
Avoid sharp twist or bend in hose by using proper angle adapters.



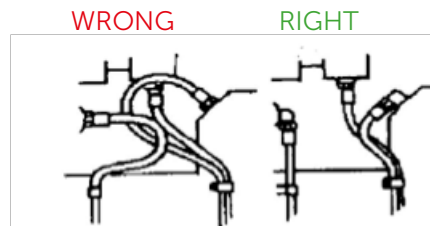
Adequate hose length is most important to distribute movement on flexing applications and to avoid abrasion



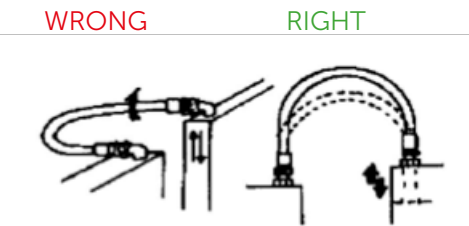
Where the radius falls below the required minimum, an angle adapter should be used as shown above to avoid sharp bends in hose.



To avoid twisting in hose lines bent in two planes, clamp hose at change of plane, as shown.



Obtain direct routing of hose through use of 45° and 90° adapters and fittings. Improve appearance by avoiding excessive hose length.



To prevent twisting and distortion, hose should be bent in the same plane as the

PART 10

Material guide

MATERIAL GUIDE

SBR	SBR	Styrene-Butadiene-Rubber	Good physical properties, including Rubber abrasion, but has poor resistance to petroleum based fluids.
NR	Natural Rubber	Isoprene Rubber	Excellent physical properties including abrasion, and low temperature resistance. Poor resistance to petroleum based fluids.
NBR	Nitrile, Buna N	Acrylo-Nitrile butadiene Rubber	Excellent resistance to petroleum based fluids. Good physical properties. Moderate resistance to aromatics.
EPDM	Ethylene propylene Rubber	Ethen Propene Diene terpolymer	Excellent resistance to weathering, ozone, heat, water, steam, glycoether, brake fluids and vegetable oils. Poor resistance to petroleum based fluids.
IIR	Butyl	Isobutene Isoprene Rubber	Excellent aging and weathering resistance with good physical properties. Low permeability to air. Poor resistance to petroleum based fluids.
CSM	Hypalon, (DuPont's trade name)	Chlorosulphonated polyethylene	Excellent weathering, ozone, and acid resistance. Reasonable resistance to petroleum based fluids but not aromatics.
CR	Neoprene, (DuPont's trade name)	Chloroprene, (Poly-Chloro Butadiene)	Good aging and weathering resistance with good physical properties. Fair resistance to petroleum based fluids, but not high aromatics. Flame retarding.
XLPE	Cross-linked Polyethylene	Polyethylene with cross-linking agent	Excellent chemical, heat and electrical properties.
BR	Butadiene rubber	Poly-Butadiene	Excellent low temperature and abrasion properties, with high resilience.
PVC	Polyvinyl chloride	Poly-Vinyl chloride	Good weather resistance, oil resistance and flame resistance. Poor low and high temperature properties.
CIIR	Chlorinated Butyl	Chloro-isobutene Isoprene	Excellent aging and weathering resistance with good physical properties. Low permeability to air. Poor resistance to petroleum based fluids.
UHPE	UHMWP	Ultra High Molecular Weight Polyethylene	Broad chemical resistance. Very good physical strength Excellent resistance to abrasion, weather, ozone and to gas permeation. Fair resistance to high and low temperature. Excellent resistance to petroleum oils and fuels. Excellent resistance to fats, oils and waxes. Limited resistance to aromatic and halogenated hydrocarbons. Poor resistance to nitric acid and oleum.
FEP	Teflon® (DuPont's trade name)	Flourinated Ethylene-Propylene	Broad chemical resistance. Very good physical strength. Useful to temperatures up to 400°F. Excellent resistance to abrasion, weather, ozone gas permeation, petroleum oils and gasolines.

PART 11

Usage tables

USAGE TABLES

This section provides tables of useful information as it particularly pertains to hose. The reader is cautioned that the following tables are intended for general reference and general applicability only. The data is based on average conditions and should not be relied upon as the sole or precise source of information available. The reader should also refer to and follow each manufacturer’s specific instructions and recommendations, if any, with regard to such information. Conversion to metric units have been rounded for convenience.

Flow of Water through 100 foot length hose, straight-smooth bore, U.S. gallons per minute. Figures are to be used as a guide since the hose inside diameter tolerance, the type of fittings used, and orifice restriction all influence the actual discharge. Thus, variations plus or minus from the table may be obtained in actual service.

Water discharge

PSI at hose inlet	Nominal hose diameters											
	1/2"	5/8"	3/4"	1"	1.1/4"	1.1/2"	2"	2 1/2"	3"	4"	6"	8"
20	4	8	12	26	47	76	161	290	468	997	2895	6169
30	5	9	15	32	58	94	200	360	582	1240	3603	7679
40	6	11	18	38	68	110	234	421	680	1449	4209	8970
50	7	12	20	43	77	124	264	475	767	1635	4748	10118
60	8	14	22	47	85	137	291	524	846	1804	5239	11165
75	9	15	25	53	95	154	329	591	955	2035	5910	12595
100	10	18	29	62	112	180	384	690	1115	2377	6904	14712
125	11	20	33	70	126	203	433	779	1258	2681	7788	16595
150	12	22	36	77	139	224	478	859	1388	2958	8593	18313
200	15	26	42	90	162	262	558	1004	1621	3455	10038	21390

Friction loss in water hose

	1/2"	5/8"	3/4"	1"	1.1/4"	1.1/2"	2"	2.1/2"	3"	4"	5"	6"	8"	10"	12"
1	1,54														
2	5,09	1,72	0,71												
5	27,7	9,36	3,85	0,95	0,32	0,13									
10	100	33,7	13,9	3,42	1,15	0,47	0,12								
15		71,4	29,4	7,24	2,44	1,00	0,25	0,08							
20		122	50,0	12,3	4,16	1,71	0,42	0,14							
25			75,6	18,6	6,28	2,59	0,64	0,21							
30			106	26,1	8,80	3,62	0,89	0,30	0,12						
35			141	34,7	11,7	4,82	1,19	0,40	0,16						
40				44,4	15,0	6,17	1,52	0,51	0,21						
45				55,3	18,6	7,67	1,89	0,64	0,26						
50				67,1	22,7	9,32	2,30	0,77	0,32						
60				94,1	31,7	13,1	3,22	1,09	0,45						
70				12,5	42,2	17,4	4,28	1,44	0,59						
80					54,0	22,1	5,48	1,85	0,76						
90					67,2	27,7	6,81	2,20	0,95	0,23					
100					81,7	33,6	8,28	2,79	1,15	0,28					
125					123	50,8	12,5	4,22	1,74	0,43					
150						71,1	17,5	5,91	2,43	0,60	0,20				
175						94,6	23,3	7,86	3,24	0,80	0,27				
200						12,1	29,8	10,1	4,14	1,02	0,34				
225							37,1	12,5	5,15	1,27	0,43				
250							45,1	15,2	6,26	1,54	0,52				
275							54,8	18,1	7,47	1,64	0,62				
300							63,2	21,3	8,77	2,16	0,72	0,30			
350							84,0	26,3	11,7	2,87	0,97	0,40			
400							108	36,3	14,9	3,68	1,24	0,51			
450								46,1	18,6	4,57	1,54	0,64			
500								54,8	22,6	5,56	1,68	0,77	0,19		
600								76,8	31,6	7,79	2,63	1,08	0,27		
700								102	42,1	10,4	3,40	1,44	0,35	0,12	
800								131	53,8	13,3	4,47	1,84	0,45	0,15	
1000									81,4	20,0	6,76	2,78	0,69	0,23	0,10
1200									114	29,1	9,47	3,90	0,96	0,32	0,13
1400									152	37,3	12,6	5,18	1,28	0,43	0,18
1600										47,8	16,1	6,64	1,64	0,55	0,23
1800										59,5	20,0	8,25	20,3	0,69	0,28
2000										72,2	24,4	10,5	2,47	0,83	0,34
2500											36,8	15,2	3,73	1,26	0,52
3000											51,6	21,2	5,23	1,72	0,73