Appendices

Glossary

A

abrasion: external damage to a hose assembly caused by its being rubbed on a foreign object; a wearing away by friction. adhesion: the strength of bond between cured rubber surfaces or between a cured rubber surface and a non-rubber surface.

adhesion: the strength of bond between cured rubber surfaces or between a cured rubber surface and a non-rubber surface.

ambient/atmospheric conditions: The surrounding conditions, such as temperature, pressure, and corrosion, to which a hose assembly is exposed.

ANSI: American National Standards Institute.

application working pressure: unique to customer's application. See pressure, working.

assembly: a general term referring to any hose coupled with end fittings of any style attached to one or both ends.

ASTM: American Society for Testing and Materials.

axial movement: compression or elongation along the longitudinal axis.

B

bend radius: the radius of a bent section of hose measured to the innermost surface of the curved portion.

bend radius, minimum: the smallest radius at which hose or tubing can be used. For Metal Hose: the radius of a bend measured to the hose centerline, as recommended by the manufacturer.

blister: a raised spot on the surface or a separation between layers, usually forming a void or air-filled space in the vulcanized hose.

bloom: a discoloration or change in appearance of the surface of a rubber hose caused by the migration of a liquid or a solid to the surface. Examples—Sulfur bloom, wax bloom. Not to be confused with dust on the surface from external sources.

bore: a fluid passageway.

braid: the woven portion of a hose used as reinforcement to increase pressure rating and add hoop strength. Various materials such as polyester, cotton or metal wire are used. A hose may have one or more braids, outside or between layers of hose material.

braided hose: hose in which the reinforcing material has been applied by braiding.

braider: a machine for making braid. The yarn is drawn off of several bobbins while they move in and out during their travel around the center of the machine. These yarns are thus intertwined in a regular manner according to the desired pattern.

braided ply: a layer of braided reinforcement.

brand: a mark or symbol identifying or describing a product and/or manufacturer, that is embossed, inlaid or printed.

burst pressure: pressure at which a hose will fail and burst. Most Eaton hoses are rated with burst pressures of 4 times the maximum working pressure. Steam hoses are rated with a burst pressure of 10 times the maximum working pressure.

C

capped end: a seal on the end of a hose to protect internal reinforcement.

carcass: the fabric, cord and/or metal reinforcing section of a hose as distinguished from the hose tube or cover.

cemented end: a capped end accomplished by means of cement

chalking: the formation of a powdery surface condition due to disintegration of surface binder or elastomer by weathering or other destructive environments.

checking: the short, shallow cracks on the surface of a rubber product resulting from damaging action of environmental conditions.

chemical compatibility: the relative degree to which a material may contact another without corrosion, degradation or adverse change of properties.

chemical resistance: the ability of a particular polymer, rubber compound, or metal to exhibit minimal physical and/or chemical property changes when in contact with one or more chemicals for a specified length of time, at specified concentrations, pressure, and temperature.

cold flex: act or instance of bending or bowing a rubber hose under conditions of cold environment.

cold flexibility: relative ease of bending while being exposed to specified low temperature.

collar: 1) the portion of a fitting that is compressed by crimping to seal the hose onto the fitting barbs and create a permanent attachment; also called a ferrule. (With field attachable fittings, the lock and seal are accomplished mechanically by the collar without crimping); 2) a raised portion on the hose shank which functions as a connection for a ferrule or other locking device or functions as a hose stop.

Coll-O-Crimp: a line of hydraulic and pneumatic hose, hose end fittings, and fabrication equipment that is a registered trademark of Eaton Corporation.

combustible liquid: a combustible liquid is one having a flash point at or above +100°F (37.8°C).

compound: the mixture of rubber or plastic and other materials, which are combined to give the desired properties when, used in the manufacture of a product.

conductive: the ability to transfer electrical potential.

core: the inner portion of a hose, usually referring to the material in contact with the medium.

corrosion: the process of material degradation by chemical or electrochemical means.

corrosion resistance: ability of metal components to resist oxidation.

coupled lengths: individual lengths of hose with couplings attached. This may be, as specified, either the length of exposed hose or the overall length including couplings.

coupling: a device attached to the end of hose or conduit to facilitate connection to a suitable fitting and insure a passageway.

coupling: a frequently used alternative term for hose end fitting.

cover steam: mark or line resulting from applying cover from calendered stock.

cover: the outer component usually intended to protect the carcass of a product.

CPE: chlorinated polyethylene, a rubber elastomer.

cracking: a sharp break or fissure in the surface, generally caused by strain and environmental conditions.

crazing: a surface effect on rubber articles characterized by multitudinous minute cracks.

crimp diameter: the distance across opposite flats after crimping.

crimp/crimping: a hose end fitting attachment method utilizing a number of dies mounted in a radial configuration. The dies close perpendicular to the hose and fitting axis, compressing the collar, ferrule, or sleeve around the hose.

cure: the act of vulcanization. See vulcanization.

cut-off factor: the hose length to be subtracted from the overall assembly length that allows for the hose coupling end connection extension beyond the end of the hose.

D

date code: any combination of numbers, letters, symbols or other methods used by a manufacturer to identify the time of manufacture of a product.

deburr: to remove ragged edges from the inside diameter of a hose end.

design factor: a ratio used to establish the working pressure of the hose, based on the burst strength of the hose.

DOT: Department of Transportation.

durometer: an instrument for measuring the hardness of rubber and plastic compounds.

E

eccentricity: the condition resulting from the inside and outside diameters not having a common center.

effusion: the escape, usually of gases, through a material. See permeation.

elastic limit: the limiting extent to which a body may be deformed and yet return to its original shape after removal of the deforming force.

elastomer: any one of a group of polymeric materials, usually designated thermoset, such as natural rubber, or thermoplastic, which will soften with application of heat.

elongation: the increase in length expressed numerically as a percentage of the initial length.

end force: an internal pressure which acts outward toward the ends of the tube.

endurance test: a service or laboratory test, conducted to product failure, usually under normal use conditions.

enlarged end: An end with inside diameter greater than that of the main body of hose.

EPDM: Ethylene Propylene Diene Monomer; an elastomer.

EVA: Ethyl Vinyl Acetate

extrude/extruded/ extrusion: forced through the shaping die of an extruder; extrusion may have a solid or hollow cross section.

F

fabric impression: impression formed on the rubber surface during vulcanization by contact with fabric jacket or wrapper.

fabricator: the producer of hose assemblies.

fatigue: the weakening or deterioration of a material occurring when a repetitious or continuous application of stress causes strain, which could lead to failure.

FDA: United States Food and Drug Administration.

fire sleeve: slip-on or integrally extruded sleeve used to retard the effects of fire in certain applications; most often made with silicone and/or ceramic fiber.

flammable gases/liquid/ media: a flammable gas, including liquefied gas, is one having a closed cup flash point below +100°F (+37.8°C) and a vapor pressure greater than 25 psi. (174.2 KPa).

flange: (1) Metal ring attached to pipe nipples. (2) Raised edge on hose.

flex cracking: a surface cracking induced by repeated bending and straightening.

filler: the yarn which interlaces with the warp yarn to form a woven fabric.

flow rate: a volume of media being conveyed in a given time period.

fluid: a gas or liquid medium.

fluorocarbon: an organic compound containing fluorine directly bonded to carbon. The ability of the carbon atom to form a large variety of structural chains gives rise to many fluorocarbons and fluorocarbon derivatives.

G

GPM: gallons per minute.

GHT: garden hose thread.

H

heat resistance: the property or ability to resist the deteriorating effects of elevated temperatures.

helix: a shape formed by spiraling a wire or other reinforcement around the cylindrical body of a hose; typically used in suction hose.

hoop force: an internal pressure which acts outward on the walls of the inner tube.

hose: a flexible conduit consisting of a tube, reinforcement, and usually an outer cover.

hydrostatic testing: the use of liquid pressure to test a hose or hose assembly for leakage, twisting, and/or hose change-inlength.

I

I.D.: the abbreviation for inside diameter.

identification yarn: a yarn of single or multiple colors, usually embedded in the hose wall, used to identify the manufacturer.

impression: a design formed during vulcanization in the surface of a hose by a method of transfer, such as fabric impression or molded impression.

impulse: an application of force in a manner to produce sudden strain or motion, such as hydraulic pressure applied in a hose.

innertube: the innermost layer of a hose; the hose material in contact with the medium.

ISO: International Organization for Standardization.

J

jacket: (1) A seamless tubular braided or woven ply generally exposed on outside. (2) A woven fabric used during vulcanization by the wrapped "cure" method.

K

knitter: a machine capable of forming a fabric by the action of needles engaging threads in such a manner as to cause a sequence of interlaced loops from forming a continuous tubular structure.

kinking: a temporary or permanent distortion of the hose induced by bending beyond the minimum bend radius.

L

layer: a single thickness of rubber or fabric between adjacent parts.

layline: the line of printed information that runs parallel on the side of a manufactured hose giving details such as part number, PSI rating, hose size and manufacturing data.

leno breaker: an open-mesh fabric made from coarse ply yarns with a leno weave. A leno weave is one in which certain warp threads—termed doup or crossing threads—are passed from side to side of one or more ends—termed standard threads— and are bound in by the filling in this position. Where the crossed interlacing occurs an open perforated structure is formed.

lined hose: fire hose having a seamless woven jacket or jackets and an internal rubber tube.

LPG, LP Gas: the abbreviation for liquefied petroleum gas.

M

machine made: (1) Mandrel-built reinforced hose made by machine, as opposed to hose built by hand. (2) Tubing that is processed without internal support.

media, medium: the substance(s) being conveyed through a system.

mandrel: a form, usually of elongated round section, used for size and support hose during fabrication and/or vulcanization. It may be rigid or flexible.

mandrel built: a hose fabricated and/or vulcanized on a mandrel.

mandrel wrapped: built up by wrapping an unvulcanized sheet on a mandrel.

manufacturer's identification: a code symbol used on or in some hose to indicate the manufacturer.

MAWP: see pressure, maximum allowable working.

minimum bend radius (MBR): minimum radius to which a hose may be bent without compromising the integrity of construction. According to RMA IP-11-7 Chemical Hose Bulletin, crushed or kinked sections where the hose O.D. is reduced by 20% or more of the normal indicate internal damage of the reinforcement and/or tube.

MSDS: Material Safety Data Sheet.

MSHA: Mine Safety and Health Administration.

N

NAHAD: the abbreviation for the National Association of Hose & Accessories Distributors.

necking down: the diminution of the cross-section of a rubber hose.

nitrile rubber (NBR/Buna-N): a family of acrylonitrile elastomers used extensively for industrial hose.

nominal: a size indicator for reference only.

nomograph: a chart used to compare hose size to flow rate to recommended velocity.

non-conductive: the inability to transfer an electrical charge.

nozzle end: an end of hose in which both the inside and outside diameters are reduced.

NPT/NPTF: abbreviation for national pipe threads. See fitting/coupling - Pipe Thread Fittings.

NSF: National Sanitation Foundation.

nylon: a family of polyamide materials.

O

OAL: see overall length

O.D.: the abbreviation for outside diameter.

oil resistance: the ability of the materials to withstand exposure to oil.

oil swell: the change in volume of a rubber article resulting from contact with oil.

operating conditions: the pressure, temperature, motion, and environment to which a hose assembly is subjected.

overall length (OAL): the total length of a hose assembly, which consists of the free hose length plus the length of the coupling(s).

oxidation: the reaction of oxygen on a material, usually evidenced by a change in the appearance or feel of the surface or by a change in physical properties.

ozone cracking: the surface cracks, checks or crazing caused by exposure to an atmosphere containing ozone.

ozone resistance: the ability to withstand the deteriorating effects of ozone (generally cracking).

P

Pancure: a vulcanization process in which the hose is taken from the covering operation, coiled either on reels or horizontal pans and placed directly into the vulcanizer.

permeation: the process of migration of a substance into and through another, usually the movement of a gas into and through a hose material; the rate of permeation is specific to the substance, temperature, pressure and the material being permeated.

pinpricked: perforations through the cover of a hose to vent permeating gases.

pitch: 1) the distance from one point on a helix to the corresponding point on the next turn of the helix, measured parallel to the axis; 2) the distance between the two peaks of adjacent corrugation or convolution.

plating: a material, usually metal, applied to another metal by electroplating, for the purpose of reducing corrosion; typically a more noble metal such a zinc is applied to steel.

plied yarns: a yarn made by twisting together two or more single yarns.

ply: an individual layer in hose construction.

polymer: a macromolecular material formed by the chemical combination of monomers, having either the same or different chemical compositions.

porous tube: (1) The physical conditions of a hose tube due to presence of pores.
(2) A hose tube that has low resistance to permeation.

pressure: force ÷ unit area. For purposes of this document, refers to PSIG (pounds per square inch gauge).

pressure drop: the measure of pressure reduction or loss over a specific length of hose.

pressure, burst: the pressure at which rupture occurs.

pricker marks: the marks due to perforating the cover of the hose prior to or after vulcanization.

proof pressure test: a non-destructive hydrostatic pressure test applied to a product to show up possible defects.

psi (PSI): pounds of pressure per square inch of area (lb2/in).

PTFE: polytetrafluoroethylene, a high molecular weight fluoroplastic polymer with carbon atoms shielded by fluorine atoms having very strong inter atomic bonds, giving it chemical inertness.

PVC: polyvinyl chloride. A low cost thermoplastic material typically used in the manufacture of industrial hoses. The operating temperature range is -500°F to +1750°F (-295.5°C to +954.4°C).

R

reinforcement: (1) The strength members, consisting of fabric, cord, and/or metal, of a rubber hose. (2) The non-rubber elements making up a rubber hose. (3) The non-rubber compounding ingredients which impart increased tensile strength or other desirable properties.

RMA: The Rubber Manufacturers Association, Inc.

rough-bore hose: a wire reinforced hose in which a wire is exposed in the bore.

S

SAE: Society of Automotive Engineers.

safety factor: divisor of burst pressure used to determine working pressure.

service test: a test which makes the hose operate under service conditions in the actual equipment.

smooth bore hose: a wire reinforced hose in which the wire is not exposed in the bore.

smooth-bore: a term used to describe the type of inner core in a hose.

soft end: an end in which the rigid reinforcement of the body, usually wire, is omitted.

specification: a document setting forth pertinent details of a product.

specific gravity: the ratio of the weight of a given substance to the weight of an equal volume of water at a specified temperature.

spiral: a method of applying reinforcement in which there is not interlacing between individual strands of the reinforcement.

static wire: a wire incorporated in a rubber hose to give quality or additional power to conducting or transmitting static electricity.

straight end: an end with inside diameter the same as that of the main body.

standard: a document, or an object for physical comparison, for defining product characteristics, products, or processes, prepared by a consensus of a properly constituted group of those substantially affected and having the qualifications to prepare the standard for use.

static wire: wire incorporated in a hose to conduct static electricity.

stem: see nipple.

surge (spike): a rapid and transient rise in pressure.

swelling: an increase in volume or linear dimension of a specimen immersed in liquid or exposed to a vapor.

T

tight braid: (1) An unevenness in the braid reinforcement caused by one or more ends of the reinforcement being applied at a greater tension than the balance of the ends of the braided reinforcement. (2) Also refers to a localized necking down of the braided reinforcement caused by a braider stop or some other cause.

tube: the innermost continuous all-rubber or plastic element of a hose.

tubing: a non-reinforced, homogeneous conduit, generally of circular cross-section.

U

UL: Underwriters' Laboratories, Inc.

V

vacuum: full vacuum is 29.92 in Hg.

vacuum resistance: the measure of a hoses ability to resist negative gauge pressure.

vibration: amplitude motion occurring at a given frequency.

viscosity: the resistance of a material to flow.

vulcanization: a process during which a rubber compound, through a change in its chemical structure, improves or extends elastic properties over a greater range of temperature.

W

warp: (1) The yarn that runs lengthwise in a woven fabric. Also called chain or twist. An individual thread of warp is termed an end. (2) The sheet of yarns laid together in parallel order on a beam to form a warp.

weathering: the surface deterioration of a hose cover during outdoor exposure, as shown by checking, cracking, crazing and chalking.

wire braid: a ply of braided wire reinforcement.

wire reinforced: a hose containing wires to give added strength, increased dimensional stability; crush resistance. See reinforcement

working pressure (WP): maximum pressure at which a hose is designed to operate.

working temperature: the temperature range of the application, may include the temperature of the fluid conveyed or the environmental conditions the assembly is exposed to in use.

woven jacket: a seamless jacket with continuous parallel warp yarns interlaced spirally with continuous filler elements.

wrapper marks: impressions left on the surface by the material used to wrap the hose during vulcanization. Usually shows characteristics of a woven pattern and wrapper with edge marks.

Y

yarn: a generic term for a continuous strand of textile fibers or filaments in a form suitable for knitting, weaving, or otherwise intertwining to form a textile fabric. It may comprise (a) a number of fibers twisted together,
(b) a number of filaments laid together without twist (a sertwist yarn), (c) a number of filaments laid together with more or less twist, or (d) a singe filament with or without twist (a monofilament).

This Glossary of Terms, as utilized in the hose industry, includes some definitions from The Hose Handbook, published by the Rubber Manufacturers Association.

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Hose Selection Worksheet

Eaton recommends using the STAMPED process to aid in determining the correct hose and coupling for your application. This worksheet is designed to help you organize information for determining the best hose for a given application. The questions are based on the hose selection factors described earlier in this catalog.

When selecting a hose, always use this worksheet in conjunction with this catalog. Read all instructions concerning the hose you are selecting. If any questions arise contact Eaton Technical Support at 1-888-258-0222.

S - Size (I.D., O.D. and length)

T - Temperature of material conveyed and environmental

A - Application, the conditions of use

M - Material being conveyed, type and concentration

P - Pressure to which the assembly will be exposed

E - Ends; style, type, orientation, attachment methods, etc.

D - Delivery testing, quality, packaging, and delivery requirements

1. Size

Flow (cubic feet per minute) requirements? _____

See RMA Water Discharge table.

Hose I.D. requirements given the flow requirements? _____

Pressure drop? _____

Length requirements (excluding hose ends)? _____

2. Temperature

Temperature range of material to be transferred?

Min. _____ Max. _____ Average _____

Year-round external environment temperature range? _____

Cleaning temperature? _____

3. Application

If the application is new, what service is to be performed?_____

If it is an existing application, do not replace a failed hose without finding out the cause of the failure. The hose may have been specified incorrectly originally. Ask the following questions:

What hose was in use? _____

Why did it fail? _____

How long did the hose last? _____

Have the service conditions changed since the failed hose was installed? _____

Any movement during loading or unloading process such as flexing or other repetitive motion? __

What other hose conditions exist in addition to the one at the failure point? _____

Was hose cleaned and dried prior to transferring the next material? _____

Examine other hoses in similar service to avoid unexpected failures. _____

4. Material: Compatibility & Environment

Internal and external environment consideration. Internal environment relates to the material being conveyed. External environment relates to anything originating from outside the hose.

Check all that apply.

- ☐ Abrasive materials (conveyants and external)
- ☐ Petroleum products (aromatics, aliphatics, etc.)
- ☐ Materials that could cut or gouge hose
- ☐ Solvents
- ☐ Ozone
- ☐ Acids/caustics
- ☐ Animal fats (oils)
- ☐ Sparking or flames
- ☐ Cleaning with steam

Material to be transferred? _____

Material concentration (%)? _____

What hose cleaning solution(s) will be used? _____

S - Size (I.D., O.D. and length)

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5. Pressure & Suction

What working pressure is required? _____

Are pressure surges involved in this application? How high? _____

What safety factor is required? _____

Is this a suction application? What vacuum rating is required? _____

6. Ends

End 1 _____

Material _____

Attachment Method _____

7. Delivery

Qty. required _____ Date required _____ Pkg. requirements _____

Testing Required - ☐ No ☐ Yes If Yes, Type: _____

Certification Required - ☐ No ☐ Yes If Yes, Type: _____

Special Requirements/Other Information

Will the selected hose need to possess any of the following features:

Branding information needed on the hose? _____

Color coding? _____

Any special designations required by agencies or associations? _____

Will any regulatory agency approvals be required? If yes, which one(s)? _____

Non-conductive rubber needed to prevent transmittal of electricity? _____

Static wire or static-dissipating tube to prevent static electricity buildup and discharge sparks? _____

Pinpricked cover to resist blistering when transferring hot materials or air/gases under pressure? _____

Abrasion sleeve or guard? _____

Heat shield? _____

Sub-zero exposure resistance? _____

Special assembly requirements? _____

Continuous transfer service or intermittent service? _____

Flexibility: Do space restrictions exist where the hose will be used? _____

Bend Radius: of the hose relative to space in which hose will be used? _____

Considering the intended use of the hose, how flexible will it need to be (check one)?

☐ Extremely flexible ☐ Slightly flexible ☐ Not an issue

Weight: How will the hose be handled during use, if all? _____

How important is the weight of the hose going to be in this application (check one)?

☐ Very important ☐ Slightly important ☐ Not an issue

Be sure to reference chemical compatibility recommendations in the Chemical Compatibility Charts starting on page D-3.

If you have any questions, please contact Eaton Technical Support at 1-888-258-0222.