PTFE AND FEP HEAT-SHRINKABLE SLEEVING

Heat-shrinkable PTFE or FEP sleeving is the ultimate choice for applications that need high resistance to temperature, chemicals, solvents, UV light etc. With a choice of shrink ratios up to 4:1, working temperature of up to 260°C, the applications for these materials is limitless.

Newly developed production methods mean that our fluoroplastic heat-shrink sleevings can now be competitive with inferior polymers such as polyolefin and PVDF and with their use product quality can be improved with little or no extra cost.

We offer the choice of PTFE or FEP heat-shrink sleeving each having their own special properties both in shrinking characteristics and in working performance.

PTFE HEAT-SHRINK SLEEVES

PTFE heat-shrink sleeves are made from pure virgin PTFE with no fillers or additives and therefore offer all the exceptional properties of PTFE. The major characteristic is an upper continuous working temperature of 260°C. This exceeds that of any other heat-shrink polymer. In addition it is completely resistant to virtually all chemicals, and UV radiation. It is available in 4:1 and 2:1 shrink ratios, and the

FEP HEAT-SHRINK SLEEVES

Like PTFE heat-shrink, FEP offers all the unique properties of fluoroplastics, but with one exceptional addition. Whilst the maximum continuous working temperature is 200°C the shrinking temperature is only 110°C. This means it can safely be shrunk over temperature sensitive materials without damage. Couple this property with its transparency, complete chemical resistance, total UV resistance and non-stick nature you have a very unique material.

Properties that make PTFE and FEP unique

- Virtual total chemical and solvent resistance.
- Working temperature from -200° to +260°C.
- Remains flexible at cryogenic temperatures.
- Very low coefficient of friction.
- Non-stick surface.
- Extremely high electrical resistance.
- Very low dielectric loss at high frequencies.
- Total resistance to UV radiation.
- Naturally non-inflammable.
- Non-toxic.
- Inert to body tissue (does not cause reaction).

FEP EASY SHRINKABLE SLEEVING

ADTECH FHS series heat-shrink tubing combines the outstanding properties of FEP - high resistance to temperature, voltage, chemicals etc., With a low shrink temperature around 110°C. This enables many materials to be covered in FEP for mechanical, electrical and chemical protection. In addition the non-stick properties are maintained.

Applications for FEP heat-shrink are very varied and include cable jackets, non-stick rollers, sensor probe covers, hose protection, electrical terminal insulation.

A major advantage of FEP heat-shrink tube, is the fact that it can be heat-sealed or welded to itself. This means that parts can be covered with the material and then heat-sealed so that the part can be completely encapsulated. This technique is used to advantage in the manufacture of corrosion resistant sensor probes in the process industries.

FEP STANDARD WALL

ADTECH Part No.	Supplied ID mm	Shrunk ID mm	Wall mm
FHS2	2.7	2.0	0.2
FHS2.7	3.6	3.0	0.2
FHS3.6	4.8	3.6	0.27
FHS4.6	6.2	4.6	0.3
FHS6	8.0	6.0	0.3
FHS7	9.5	7.0	0.5
FHS9	12	9.0	0.5
FHS10	13.5	10	0.5
FHS11	15	11	0.5
FHS13	17	13	0.5
FHS16	21	16	0.5
FHS19	25	19	0.5
FHS23	31	23	0.5
FHS27	36	27	0.5
FHS32	43	32	0.5
FHS40	54	40	0.5
FHS46	62	46	0.5
FHS56	76	56	0.5
FHS65	81	65	0.5
FHS80	96	80	0.5
FHS95	115	95	0.5
FHS113	150	113	0.7

FEP LIGHT WALL

ADTECH Part No.	Supplied ID mm	Shrunk ID mm	Wall mm
FHS2L	2.7	2.0	0.2
FHS3.8L	5.1	3.8	0.25
FHS5.5L	7.4	5.5	0.25
FHS7.5L	10.2	7.5	0.25
FHS9.5L	12.8	9.5	0.25
FHS13L	18	13	0.25
FHS16L	22	16	0.25
FHS19L	27	19	0.25
FHS23L	31	23	0.25
FHS27L	36	27	0.25
FHS32L	44	32	0.25
FHS39L	53	39	0.25
FHS46L	62	46	0.25

FEP HEAVY WALL

ADTECH Part No.	Supplied ID mm	Shrunk ID mm	Wall mm
FHS23H	31	23	1.5
FHS37H	50	37	1.5
FHS49H	66	49	1.5
FHS61H	82	61	1.5
FHS74H	100	74	1.5
FHS98H	132	96	1.5

TECHNICAL DATA SUMMARY

BEFORE SHRINKING		AFTER SHRINKING	
Shrink temperature	110°C (Approx.)	Chemical & solvent resistance	Virtually total
Shrink ratio	1:1.35 nominal	Hardness	D55
Shelf life	Infinite	UV resistance	Completely unaffected
Max. Storage temperature.	40°C	Water absorption	0.01% or less
Colour	Transparent	Coefficient of friction	0.01
Toxicity	Completely non-toxic	Flammability	Non-inflammable (naturally)
Working temperature range	-200° to +200°C	Radiation resistance	1 megarad
Length change on shrinking	0 to + 15%	Melt temp. (for sealing)	280°C

PTFE 4:1 AND 2:1 SHRINKABLE SLEEVING

PTFE heat-shrink sleeve offers the ultimate in heat shrink sleeve performance. Sleevings up to 31mm have a 4:1 shrink ratio, thus very complex shapes or terminals can be covered. The resulting shrunk sleeve is very tough, has outstanding voltage breakdown resistance, and very high temperature resistance. The maximum continuous working temperature is 260°C, but the PTFE is still tough at 300°C and is not damaged by short term exposure to 400°C. Because of these properties, PTFE heat-shrink sleeve is widely used in fire critical applications where it can withstand the fire environment for a short time and of course it is naturally non-inflammable.

The shrinking temperature of 330°C must be considered when using it with materials that might be damaged during the shrinking process.

Common applications are terminal insulation on heating elements, jet engines. Also parts subjected to strong UV radiation e.g. UV lamps, external aircraft fittings etc.

PTFE SHRINK RATIO 4:1

ADTECH Part No.	Supplied ID mm	Shrunk ID mm	Wall mm
TR20	1.98	0.64	0.22
TR32	3.18	0.94	0.25
TR48	4.75	1.27	0.30
TR64	6.35	1.60	0.30
TR80	7.92	2.00	0.30
TR95	9.52	2.44	0.30
TR111	11.13	2.85	0.30
TR125	12.70	3.66	0.38
TR143	14.27	3.94	0.38
TR158	15.88	4.52	0.38
TR175	17.45	5.03	0.38
TR190	19.05	5.70	0.38
TR222	22.23	6.20	0.36
TR254	25.40	7.06	0.38
TR317	31.75	8.82	0.38
TR381	38.00	10.20	0.38

PTFE SHRINK RATIO 2:1

ADTECH Part No.	Supplied ID mm	Shrunk ID mm	Wall mm
HST30-T	0.86	0.38	0.23
HST28-T	0.97	0.46	0.23
HST26-T	1.17	0.56	0.23
HST24-T	1.27	0.64	0.25
HST22-T	1.40	0.80	0.25
HST20-T	1.52	0.97	0.30
HST18-T	1.93	1.17	0.30
HST16-T	2.35	1.45	0.30
HST14-T	3.05	1.82	0.30
HST12-T	3.81	2.26	0.30
HST10-T	4.85	2.80	0.30
HST8-T	6.10	3.55	0.38
HST6-T	7.67	4.40	0.38
HST4-T	9.40	5.45	0.38
HST2-T	10.90	6.90	0.38
HST0-T	11.95	8.56	0.38

TECHNICAL DATA SUMMARY

BEFORE SHRINKING		AFTER SHRINKING	
Shrink temperature	330°C	Working temp. range	-200 to 260°C
Shrink ratio	2:1 or 4:1 nominal	Chemical resistance	Virtually total
Shelf life	Infinite	Water absorption	0.01%
Max. Storage temperature	100°C	Hardness	D55
Colour	Translucent	UV resistance	Completely unaffected
Toxicity	Completely non-toxic	Coefficient of friction	0.01
Length change on shrinking	+/-12%	Flammability	Non-inflammable (naturally)
		Radiation resistance	0.3 megarad
		Melt temperature	Does not melt

DUAL WALL PTFE/FEP HEAT-SHRINK

Adtech **FIP** dual wall heat-shrink sleeving consists of an outer sleeve of PTFE heat-shrink and an integral inner wall of FEP. When the outer sleeve is shrunk down at 300°C, the FEP inner is melted and flows over the component underneath. When cooled the PTFE and FEP form a fused mass encapsulating the component.

If the component uses PTFE or FEP insulated cable (e.g. on a temperature sensing element) the melted FEP will adhere to the cable thus sealing the component.

Using Adtech FIP it is possible to "pot" components in a pure Fluoroplastic and protect them against mechanical and chemical exposure even in immersed conditions.

PTFE/FEP DUAL WALL

ADTECH Part No.	Supplied ID mm	Shrunk ID mm	Wall mm
FIP0-T	11.0	7.0	0.8
FIP2-T	9.5	5.5	0.8
FIP4-T	8.5	4.0	0.6
FIP6-T	6.5	3.5	0.6
FIP8-T	5.0	2.0	0.6
FIP10-T	4.0	1.5	0.6
FIP12-T	3	1.0	0.6
FIP14-T	2.2	0.5	0.6
FIP16-T	1.5	0	0.6
FIP19-T	0.9	0	0.6

SELECTION AND USE - PTFE OR FEP

FEP heat-shrink sleeve is the easiest to use followed by 2:1 PTFE then 4:1 PTFE. Therefore if other factors are not critical, select in this order of preference.

Select size by allowing a generous amount of shrinkage rather than using a tight sleeve if possible.

Hot air guns are the preferred method of applying heat. FEP shrinks down easily at 110°C, PTFE needs 330°C, so gun temperatures should be at least 200°C and 400°C respectively. To obtain the higher temperature we suggest a hot air gun of 1.5 kW capacity. Adtech can supply a hot air gun suitable for both materials.

Parts to be covered that have a large thermal mass, e.g. a solid steel roller, may need preheating when PTFE heat-shrink is applied, to prevent chilling of the PTFE, causing a loose fit. Heating the object in an oven at 400°C can be used to advantage to shrink the PTFE sleeve, particularly when a number of parts are to be covered.

Our technical dept. Are always pleased to offer advice, or cover sample items for customers. We also offer a covering service for large numbers or difficult items.

Fume Precautions during heat shrinking.

Like all plastics and rubbers fluoroplastics decompose at high temperatures and give off unpleasant fumes. Unlike other polymers, the fumes from fluoroplastics are odourless and therefore may not be noticed during overheating of the material. Ample ventilation must always be provided when heating these heat-shrink materials above 300°C. Where they are used in a production process extraction equipment is recommended.

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