

HES CONNECTION SYSTEM FAMILY OVERVIEW



• APTIV •

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The Challenge

- Harsh operating environments
- Debris and water intrusion hinders electrical system performance
- Better environmentally sealed connection systems are needed

The Solution

Introducing the HES (Harsh Environment Series) connection system family. Our most environmentally protected and ergonomic solution for harsh environment applications.



Robust **features**, meaningful **benefits**

Superior environmental protection

- Recessed seal ribs maintain integrity under wire strain
- 3-rib design for better sealing capability

Ergonomic & reliable easy mating

- Specialized finger design to eliminate terminal unseat
- Self lubricated seals & terminal hood design reduce plugging force
- Lock window, alignment arrows
- Seal color coordination
- 44% higher retention vs. competition on 1.6mm terminal

A standard, designed to outperform

- 44% higher retention vs. competition on 1.6mm terminal
- Up to 30% sealing improvement
- HES terminals provide improved electrical performance
- Interchangeable industry mating interface
- Forward/backward compatibility
- Validated to J203

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Aptiv Harsh Environment Series
terminals are designed for use in
the following industries:

Agriculture
Commercial vehicle
Construction
Marine
Other harsh environment
applications

*HES is well suited for use in harsh
environment pass-through applications
where space is limited.*



A wide family range



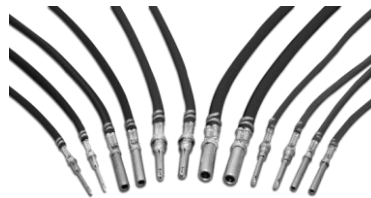
Connectors

- Inline applications
- 19 through 47 way configurations
- 24 shell connectors with 6 terminal patterns
- Standard and reverse configurations
- Thin, regular, or heavy wall



Terminals

- Pin & Sleeve terminal system
- 1.0mm, 1.6mm, or 2.4mm



Accessories

- 180° or 90° back shells
- 19mm, 22mm, 25mm conduit
- Cavity plugs

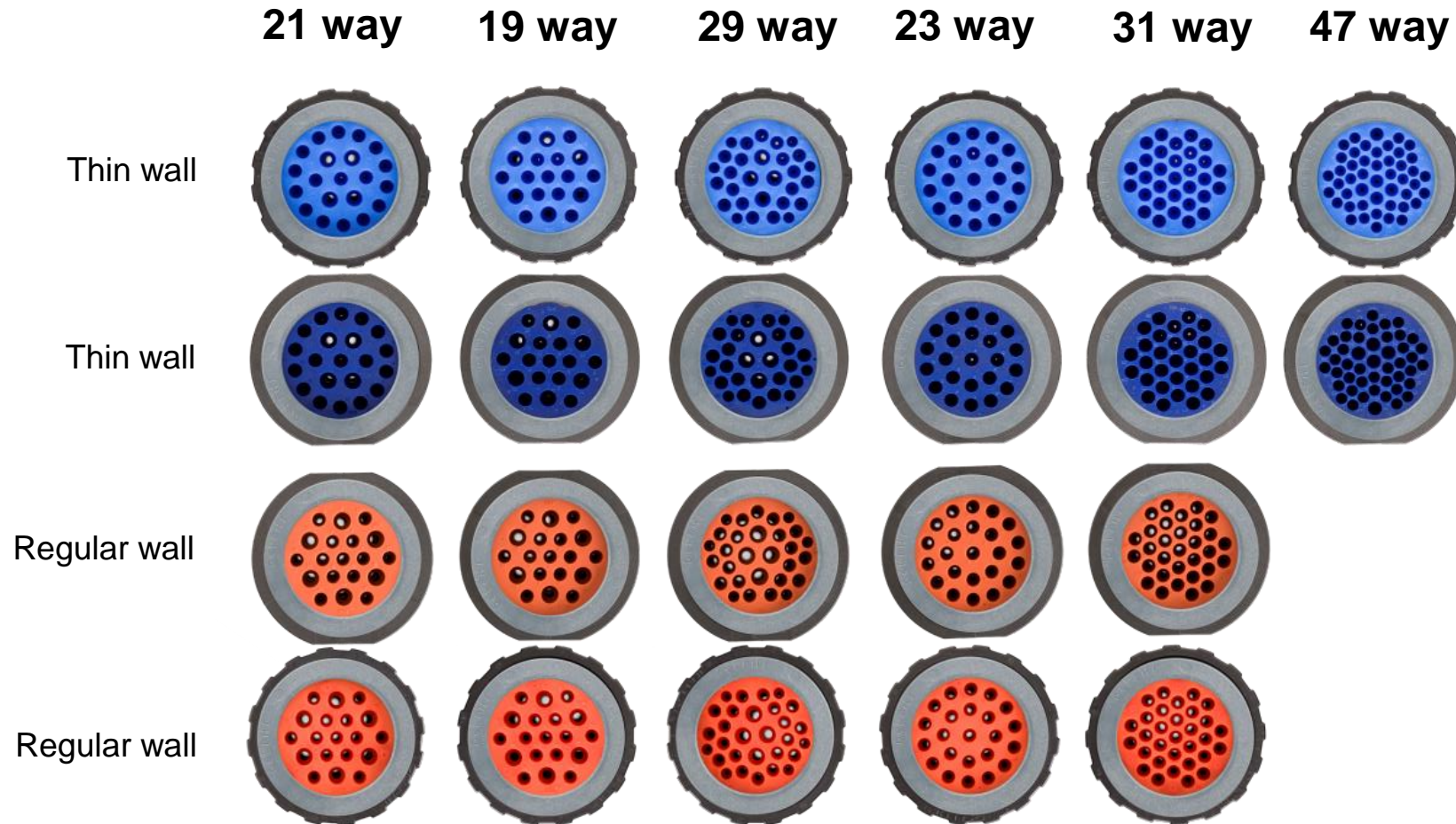


Headers

- 50 and 60 way header system



Industry standard connector configurations

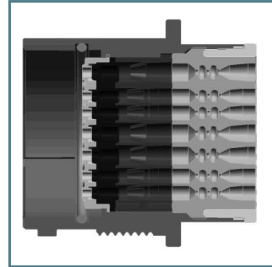
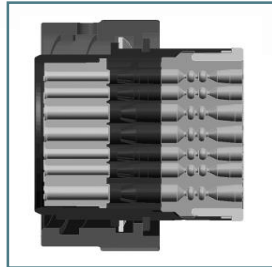


With **more** options

Standard Configuration

Plug Assembly
Female Terminals

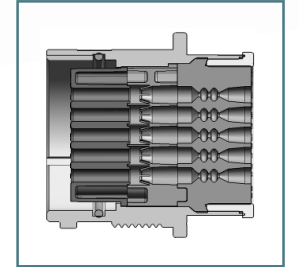
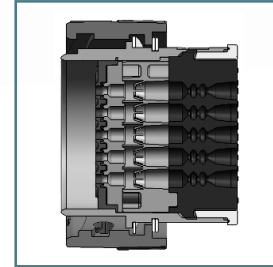
Receptacle Assembly
Male Terminals



Reverse Configuration

Plug Assembly
Male Terminals

Receptacle Assembly
Female Terminals



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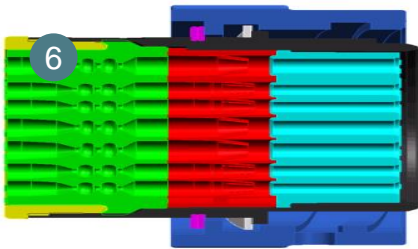
Connector design overview

Background

- Benchmarked against competition design
- Seamless “drop-in” replacement
- Interchangeability – cross mating capability
- Design improvements based on customer feedback to address competition’s shortcomings

Design features

- 1 Spring loaded locking collar for positive locking & seal integrity
- 2 Arrows for pre-alignment before mating
- 3 Lock collar with generous lead-in for easy mating
- 4 Window for a visual to verify lock engagement
- 5 Color coded seals



- 6 3 seal ribs recessed to protect from wire strain. Deeper 3-rib seals produce better sealing for tight wire dresses.



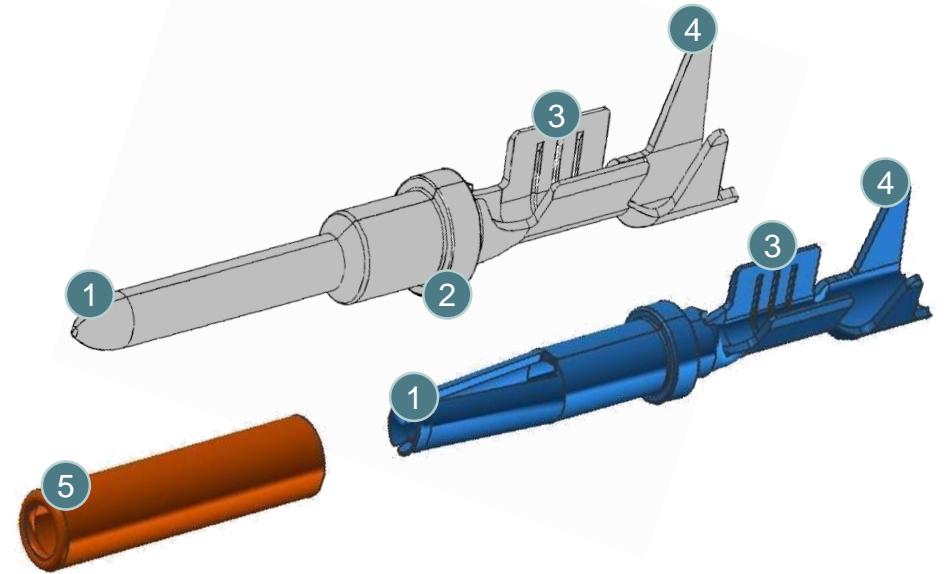
Terminal design overview

Benefits

- Higher current carrying capability
- Lower terminal-to-connector insertion force
- Applicable to broader range of cable sizes and types
- Superior electrical durability
- Validated to global standards, including J2030

Design features

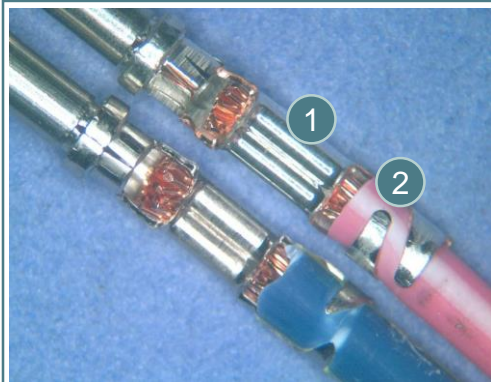
- 1 High conductivity terminal body Superior stress relaxation to ensure terminal contact stability over life. (10- 30 % improvement in current carrying capability)
- 2 Radius on lead shoulder to reduce insertion forces
- 3 Tin in crimp area results in superior crimp stability over life
Designed for SAE, DIN and JIS cable types
- 4 Aptiv overlapping wing design provides superior strain relief, and larger O.D. cable range capability
- 5 Stainless steel sleeve = stability and protection to contact interface area



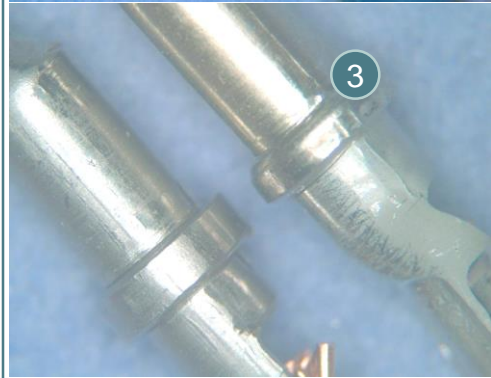
HES Size	Cable Range	Max Current on Min cable	Max Current on Max cable	Max Temp
Size 20 (1.0mm)	22ga- 16ga 0.35mm ² -1.00mm ²	11 Amps	20 Amps	150 C
Size 16 (1.6mm)	20ga- 12ga 0.50mm ² -3.00mm ²	13.5 Amps	30 Amps	150 C
Size 12 (2.4mm)	18ga- 10ga 0.80mm ² -5.00mm ²	22 Amps(16ga)	42 Amps	150 C

Competitive comparison

Superior terminal design



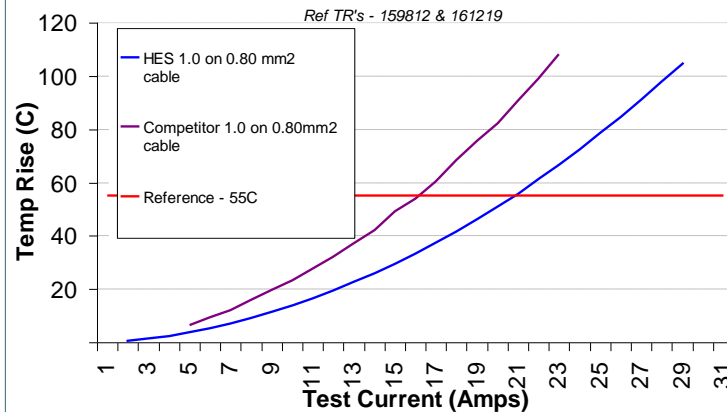
- 1 Longer core crimp
- 2 Longer insulation crimp for improved strain relief & insulation wrap



- 3 Radius on leading edge of collar for reduced insertion force

Improved electrical performance

T-Rise Curve
HES 1.0 Terminal



Better terminal insertion and retention

Size 16 (1.6mm)	Female Insertion (N)	Male Insertion (N)	Terminal Retention (N)
HES terminal in HES plastic	11.7	22	274
Competitor terminal in HES plastic	22	50.7	269
Competitor terminal in Competitor plastic	19.8	48.4	186

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Connector cross-reference & part numbers

Cavity count	Blade size (mm)	Gender	Dimensions W x H x D (mm)	Competitor part number	Aptiv part number	Configuration	Other configurations
19	2.4/1.6	M	47.5 x 50.5 x 45.4	HDP24-24-19PE	15544333	Thin	Thick, Reverse
19	2.4/1.6	F	49.4 x 49.4 x 42	HDP26-24-19SE	15544902	Thin	Thick, Reverse
21	2.4/1.6	M	47.5 x 50.5 x 45.4	HDP24-24-21PE	15544331	Thin	Thick
21	2.4/1.6	F	49.4 x 49.4 x 42	HDP26-24-21SE	15544899	Thin	Thick
23	1.6	M	47.5 x 50.5 x 45.4	HDP24-24-23PE	15544329	Thin	Thick
23	1.6	F	49.4 x 49.4 x 42	HDP26-24-23SE	15544897	Thin	Thick
29	2.4/1.6/1.0	M	47.5 x 50.5 x 45.4	HDP24-24-29PE	15544327	Thin	Thick
29	2.4/1.6/1.0	F	49.4 x 49.4 x 42	HDP26-24-29SE	15544895	Thin	Thick
31	1.6	M	47.5 x 50.5 x 45.4	HDP24-24-31PN(T)	15544326	Thin	Thick, Reverse
31	1.6	F	49.4 x 49.4 x 42	HDP26-24-31SN(T)	15544894	Thin	Thick, Reverse
47	1.6/1.0	M	47.5 x 50.5 x 45.4	HDP24-24-47PE	15544324	Thin	-
47	1.6/1.0	F	49.4 x 49.4 x 42	HDP26-24-47SE	15544892	Thin	-

Accessory part numbers



Size	Accessory	Part number
19	Backshell 180°	13767802
19	Backshell 90°	13767805
22	Backshell 180°	13767803
22	Backshell 90°	13767806
25	Backshell 180°	13667839
25	Backshell 90°	13667840
16 & 20	Cavity seal plug	13756464
12	Cavity seal plug	13756465
-	Gasket	13780240
-	Gasket with adhesive	13813956
-	Shipping cover (reverse pin cover)	13752446
-	Shipping cover (standard pin cover)	13668988
-	Nut	15417623
-	Lock washer	13840220

Terminal part numbers

Blade size (mm)	Gender	Wire gage size (mm ²)	Insulation type	Cable OD range (mm)	Nickel (Ni) part number	Gold (Au) part number
1.0	F	0.35 - 0.50	TXL	1.25 - 1.80	13711546	13711547
1.0	F	0.35 - 0.50	G/SXL	1.80 - 2.51	13654421	13654422
1.0	F	0.75 - 1.00	TXL	1.60 - 2.25	13711548	13711549
1.0	F	0.75 - 1.00	G/SXL	2.05 - 2.78	13663727	13663728
1.0	M	0.35 - 0.50	TXL	1.25 - 1.80	13711542	13711543
1.0	M	0.35 - 0.50	G/SXL	1.80 - 2.51	13654423	13654424
1.0	M	0.75 - 1.00	TXL	1.60 - 2.25	13711544	13711545
1.0	M	0.75 - 1.00	G/SXL	2.05 - 2.78	13663723	13663724
1.6	F	0.50-0.80	TXL	1.40-2.15	13697414	13697417
1.6	F	0.50-0.80	G/SXL	2.20-2.78	13663718	13690835
1.6	F	1.00-1.50	TXL	1.80-2.45	13697415	13697418
1.6	F	1.00-1.50	G/SXL	2.40-3.00	13663719	13690836
1.6	F	2.00-3.00	TXL	2.40-3.31	13697416	13697419
1.6	F	2.00-3.00	G/SXL	2.89-3.67	13663720	13690837
1.6	M	0.50-0.80	TXL	1.40-2.15	13697408	13697411
1.6	M	0.50-0.80	G/SXL	2.20-2.78	13663715	13690838
1.6	M	1.00-1.50	TXL	1.80-2.45	13697409	13697412
1.6	M	1.00-1.50	G/SXL	2.40-3.00	13663716	13690839
1.6	M	2.00-3.00	TXL	2.40-3.31	13697410	13697413
1.6	M	2.00-3.00	G/SXL	2.89-3.67	13663717	13690840

Terminal part numbers

Blade size (mm)	Gender	Wire gage size (mm ²)	Insulation type	Cable OD range (mm)	Nickel (Ni) part number	Gold (Au) part number
2.4	F	0.75-1.00	TXL	1.60-2.25	13783287	13783295
2.4	F	0.75-1.00	G/SXL	2.20-3.10	13783288	13783296
2.4	F	1.50-2.50	TXL	2.10-3.00	13783289	13783297
2.4	F	1.50-2.50	G/SXL	2.60-3.70	13783290	13783298
2.4	F	2.00-3.00	TXL	2.40-3.35	13783291	13783299
2.4	F	2.00-3.00	G/SXL	2.89-4.21	13783292	13783300
2.4	F	4.00-6.00	TXL	3.40-4.80	13783293	13783301
2.4	M	0.75-1.00	TXL	1.60-2.25	13783263	13783273
2.4	M	0.75-1.00	G/SXL	2.20-3.10	13783264	13783276
2.4	M	1.50-2.50	TXL	2.10-3.00	13783265	13783277
2.4	M	1.50-2.50	G/SXL	2.60-3.70	13783266	13783280
2.4	M	2.00-3.00	TXL	2.40-3.35	13783267	13783282
2.4	M	2.00-3.00	G/SXL	2.89-4.21	13783268	13783283
2.4	M	4.00-6.00	TXL	3.40-4.80	13783269	13783284

Why HES?

**Superior
environmental
protection**



**Ergonomic,
reliable, easy
mating**



**A standard,
designed to
outperform**



Our most environmentally protected and ergonomic solution for harsh environment applications.

Thank you.