Delphi Harsh Environment Series (HES) Connection Systems

Receptacle Plastic w/ Male Terminals Waytek Stock No.	Dephi St. No.	Deutsch PN (Receptacle Plastic w/ Male Terminals)	Plug Plastic w/ Female Terminals Waytek Stock No.	Dephi St. No.	Deutsch PN (Plug Plastic w/ Female Terminals)	# of cavities	Cable Type-Seal Color *
38760	13697108	HDP24-24-19PE	38761	13697109	HDP26-24-19SE	19	txl - blue
38762	13698346	HDP24-24-19PN	38763	13698347	HDP26-24-19SN	19	g/sxl - orange
38768	13697102	HDP24-24-21PE	38769	13697103	HDP26-24-21SE	21	txl - blue
38770	13719117	HDP24-24-21PN	38771	13698341	HDP26-24-21SN	21	g/sxl - orange
38776	13697104	HDP24-24-23PE	38777	13697105	HDP26-24-23SE	23	txl - blue
38778	13698342	HDP24-24-23PN	38779	13698343	HDP26-24-23SN	23	g/sxl - orange
38784	13697106	HDP24-24-29PE	38785	13697107	HDP26-24-29SE	29	txl - blue
38786	13698344	HDP24-24-29PN	38787	13698345	HDP26-24-29SN	29	g/sxl - orange
38792	13667925	HDP24-24-31PE	38793	13667935	HDP26-24-31SE	31	txl - blue
38794	13698338	HDP24-24-31PN	38795	13698339	HDP26-24-31SN	31	g/sxl - orange
38800	13653493	HDP24-24-47PE	38801	13653492	HDP26-24-47SE	47	txl - blue

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The Delphi Harsh Environment Series (HES) Connection Systems include circular connectors, terminals, and a J1939 diagnostic circular connector. The 24 shell size industry standard connector includes six terminal configurations (47, 31, 29, 23, 21, and 19).
The HES connection systems provide higher current capability, improved sealing, higher terminal retention and a significant cost advantage compared to standard pin-and-sleeve systems. Also, Delphi HES Connection Systems are compatible with existing systems in the commercial and agricultural vehicle markets.

Benefits

Contact (terminal) performance

- Allows maximum current ratings compared to existing systems
- Stainless steel sleeve provides stability and protection to contact interface area
- Overlapping wing design provides exceptional strain relief and larger outside diameter cable range capability
- Tin in crimp area results in superior crimp stability over life
- Crimps designed to accommodate a wide range of cable sizes

Sealing performance

- Recessed ribs maintain sealing properties if a tight wire Dress (Dress cover is special order) is applied
- 3-rib design provides up to 50% better sealing capability compared to existing designs
- Environmentally sealed to IP67

Contact (terminal) retention performance

- Robust, specialized finger design virtually eliminates terminal unseats
- Can provide up to 40% better terminal retention when compared to existing designs

Interchangeability

- Male pin and female sleeve terminal cavity compatible with all industry pin and sleeve connections
- Validated for interchangeability with industry standard products
- Frontward / backward compatibility
- Interchangeable cavity plugs
- Both straight and right angle wire dress (Dress cover is special order) covers

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Benefits (cont')

Ergonomics

- Arrows help simplify pre-engagement of locking nut for simplified mating
- Window provides visual verification of lock engagement
- Color coded seals to distinguish between various cable diameters as well as terminal gender
- Cavity identifications on mating and plugging ends of both receptacle and plug assemblies
- Terminals and seals designed for easy insertion

Robust Construction

- Rugged construction to withstand harsh environments
- Sonic welded design provides 360 degrees of contact to withstand high vibration to meet SAE J2030 standards
- Wave spring included to ensure face seal compression and lock retention
- Validated to SAE J2030 and various other customer specifications

Typical Applications

Delphi Harsh Environment Series Connection Systems are suited for the following industries:

- Agriculture
- Commercial vehicle
- Construction
- Marine
- Other harsh environment applications

They are ideally suited for making connections in a vehicle sheet metal firewall pass-through location. They are especially useful in engine compartments, though they are intended for use in any high density, in-line application. They can also be tailored to meet individual customer specifications.

Specifications

Contacts	Size 20 (1.0 mm) Size 16 (1.6 mm) Size 12 (2.4 mm)
Application Tooling	Delphi tooling available for each current configuration
Sealing Plugs	Size 20 and 16 Size 12
Operating Temperature	-55°C to +125°C
Durability	No electrical or mechanical defects after 100 cycles of engagement or disengagement (1000 cycles for the diagnostic connector)
Physical Shock	Withstands 50 Gs of mechanical shock in three axes without mechanical failure
Vibration	Sinusoidal vibration of 20 GRMS and random vibration of 12.4 GRMS without physical damage of loss of continuity
Sealing Capability	IP67 rating Withstands high pressure spray of 375 cycles of 1020 psi @ 150 galllons/hour Withstands water submersion of 3 feet without water intrusion
Corrosion Resistance	No corrosion after exposure to 100 hours of salt fog
Electrical	
Contact Current Rating	Contact Size: Max. Current (Amps): Size 20 18 Size 16 28 Size 12 40
Contact Resistance	10 mΩ for cable ≤ 18 Ga. 6.7 mΩ for cable > 16 Ga.
Dielectric Withstanding Voltage	1000 V AC
Insulation Resistance	Greater than 20 MΩ

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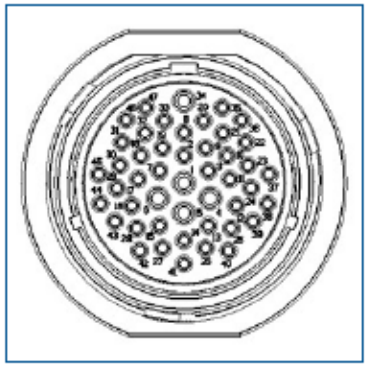
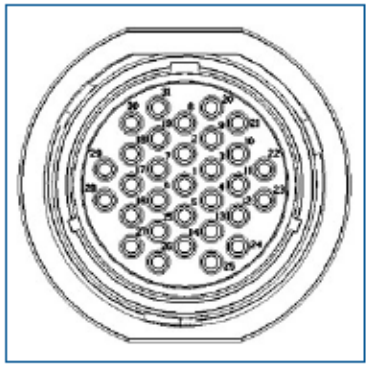
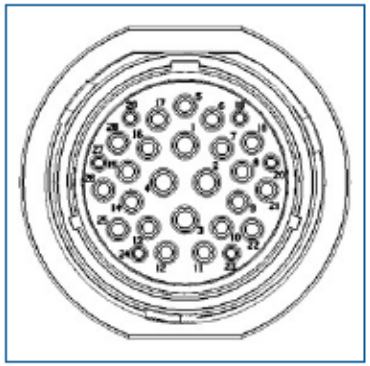
HES Terminal Pattern



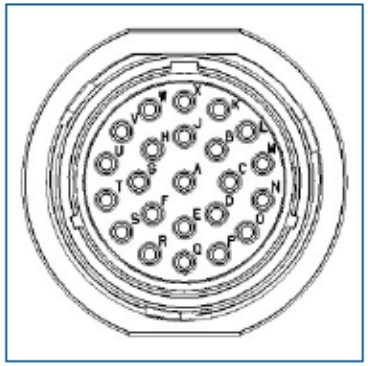
47 Way
42 size 20
5 size 16
Thin wall (blue seal)



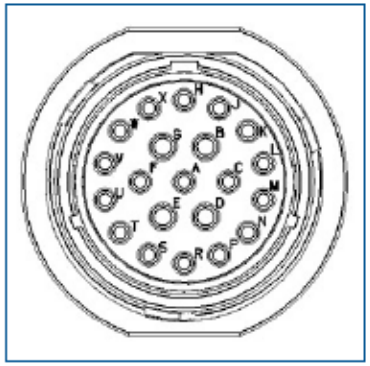
31 Way
31 size 16
Thin wall (blue seal)
Regular/heavy wall (orange seal)



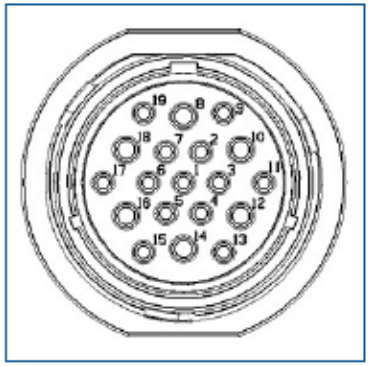
29 Way
6 size 20
19 size 8
4 size 12
Thin wall (blue seal)
Regular/heavy wall (orange seal)



23 Way
23 size 16
Thin wall (blue seal)
Regular/heavy wall (orange seal)



21 Way
17 size 16
4 size 12
Thin wall (blue seal)
Regular/heavy wall (orange seal)



19 Way
13 size 16
6 size 12
Thin wall (blue seal)
Regular/heavy wall (orange seal)

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Mechanical	
Contact Retention to Housing	Contact Size: Retention Force: Size 20 160 N Size 16 270 N Size 12 365 N
Mating Torque	Less than 4 Nm
Un-mating Torque	Less than 4 Nm
Physical	
Housing	Glass filled nylon
Seals	Silicone
Contact	Copper alloy
Female Terminal Hood	Stainless steel
Plating	Nickel and gold with tin in crimp area

Terminal Current Capacity and Wire Size

Contact Size	Wire Gauge AWG (mm^2)	Current (Amps)
20	22 Ga. (0.35 mm^2)	10
	20 Ga. (0.50 mm^2)	14
	18 Ga. (0.80 mm^2)	16
	16 Ga. (1.0 mm^2)	18
16	20 Ga. (0.50 mm^2)	14
	18 Ga. (0.80 mm^2)	18
	16 Ga. (1.0 mm^2)	22
	14 Ga. (2.0 mm^2)	24
	12 Ga. (3.0 mm^2)	28
12	14 Ga. (2.0 mm^2)	24
	12 Ga. (3.0 mm^2)	30
	10 Ga. (5.0 mm^2)	40

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Delphi Harsh Environment Series (HES) Connection Systems

Waytek Stock No.	Delphi St. No. Nickel (Ni)	Terminal Size (mm)	Terminal Type (M/F)	Wire Gage Size (mm2)	Insulation Type	Cable OD Range (mm)	Pull Strength (N)
30428	13711546	1.0	F	0.35 - 0.50	TXL	1.25 - 1.80	50 / 75
30429	13654421	1.0	F	0.35 - 0.50	G/SXL	1.80 - 2.51	50 / 75
30430	13711548	1.0	F	0.75 - 1.00	TXL	1.60 - 2.25	90 / 120
30431	13663727	1.0	F	0.75 - 1.00	G/SXL	2.05 - 2.78	90 / 120
30432	13711542	1.0	M	0.35 - 0.50	TXL	1.25 - 1.80	50 / 75
30433	13654423	1.0	M	0.35 - 0.50	G/SXL	1.80 - 2.51	50 / 75
30434	13711544	1.0	M	0.75 - 1.00	TXL	1.60 - 2.25	90 / 120
30435	13663723	1.0	M	0.75 - 1.00	G/SXL	2.05 - 2.78	90 / 120
30448	13697414	1.6	F	0.50 - 0.80	TXL	1.40 - 1.87	75 / 90
30449	13663718	1.6	F	0.50 - 0.80	G/SXL	2.20 - 2.78	75 / 90
30450	13697415	1.6	F	1.00 - 1.50	TXL	1.80 - 2.45	120
30451	13663719	1.6	F	1.00 - 1.50	G/SXL	2.40 - 3.00	120
30452	13697416	1.6	F	2.00 - 3.00	TXL	2.40 - 3.31	180 / 240
30453	13663720	1.6	F	2.00 - 3.00	G/SXL	2.89 - 3.67	180 / 240
30454	13697408	1.6	M	0.50 - 0.80	TXL	1.40 - 1.87	75 / 90
30455	13663715	1.6	M	0.50 - 0.80	G/SXL	2.20 - 2.78	75 / 90
30456	13697409	1.6	M	1.00 - 1.50	TXL	1.80 - 2.45	120
30457	13663716	1.6	M	1.00 - 1.50	G/SXL	2.40 - 3.00	120
30458	13697410	1.6	M	2.00 - 3.00	TXL	2.40 - 3.31	180 / 240
30459	13663717	1.6	M	2.00 - 3.00	G/SXL	2.89 - 3.67	180 / 240

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HES Terminal Cross Reference

HES Part Number								
Nickel (Ni)	Waytek Stock No.	Terminal Size (mm)	Terminal Type (M/F)	Wire Gage Size (mm^2)	Insulation Type	Cable OD Range (mm)	Pull Strength (N)	Deutsch PN
13711546	30428	1.0	F	0.35 - 0.50	TXL	1.25 - 1.80	50 / 75	1062-20-0222
13654421	30429	1.0	F	0.35 - 0.50	G/SXL	1.80 - 2.51	50 / 75	1062-20-0122
13711548	30430	1.0	F	0.75 - 1.00	TXL	1.60 - 2.25	90 / 120	1062-20-0222
13663727	30431	1.0	F	0.75 - 1.00	G/SXL	2.05 - 2.78	90 / 120	1062-20-0122
13711542	30432	1.0	M	0.35 - 0.50	TXL	1.25 - 1.80	50 / 75	1060-20-0222
13654423	30433	1.0	M	0.35 - 0.50	G/SXL	1.80 - 2.51	50 / 75	1060-20-0122
13711544	30434	1.0	M	0.75 - 1.00	TXL	1.60 - 2.25	90 / 120	1060-20-0222
13663723	30435	1.0	M	0.75 - 1.00	G/SXL	2.05 - 2.78	90 / 120	1060-20-0122
13697414	30448	1.6	F	0.50 - 0.80	TXL	1.40 - 2.15	75 / 90	1062-16-0622
13663718	30449	1.6	F	0.50 - 0.80	G/SXL	2.20 - 2.78	75 / 90	1062-16-0122
13697415	30450	1.6	F	1.00 - 1.50	TXL	1.80 - 2.45	120	1062-16-0622
13663719	30451	1.6	F	1.00 - 1.50	G/SXL	2.40 - 3.00	120	1062-16-0122
13697416	30452	1.6	F	2.00 - 3.00	TXL	2.40 - 3.31	180 / 240	1062-16-0722
13663720	30453	1.6	F	2.00 - 3.00	G/SXL	2.89 - 3.67	180 / 240	1062-14-0122
13697408	30454	1.6	M	0.50 - 0.80	TXL	1.40 - 2.15	75 / 90	1060-16-0622
13663715	30455	1.6	M	0.50 - 0.80	G/SXL	2.20 - 2.78	75 / 90	1060-16-0122
13697409	30456	1.6	M	1.00 - 1.50	TXL	1.80 - 2.45	120	1060-16-0622
13663716	30457	1.6	M	1.00 - 1.50	G/SXL	2.40 - 3.00	120	1060-16-0122
13697410	30458	1.6	M	2.00 - 3.00	TXL	2.40 - 3.31	180 / 240	1060-16-0722
13663717	30459	1.6	M	2.00 - 3.00	G/SXL	2.89 - 3.67	180 / 240	1060-14-0122

HES Size 24 Cable Diameter Range for Optimal Sealing Capability

Contact Size	Thin Wall Cable	Regular and Thick Wall Cable
Size 20 (1.0)	1.10 - 2.40 mm^2	1.80 - 3.05 mm^2
Size 16 (1.6)	1.30 - 2.85 mm^2	2.25 - 3.70 mm^2
Size 12 (2.4)	2.45 - 3.60 mm^2	2.90 - 4.30 mm^2
Seals accommodate SAE, DIN JIS cable		

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