Heat & Solar Radiation Shielding

MTE

Mech-Tool Engineering Ltd

BP Valhall Redevelopment Stairtower Heat Shields

MTE designed, engineered, manufactured and supplied the 316L stainless steel stairtower Heat Shields for the BP Valhall Redevelopment located in the Norwegian North Sea.

For over 50 years Mech-Tool Engineering Ltd [MTE] has been the global leader in radiant heat shielding systems to the worldwide offshore and onshore market.

Single unframed | Single framed | Double | Flare | Solar radiation

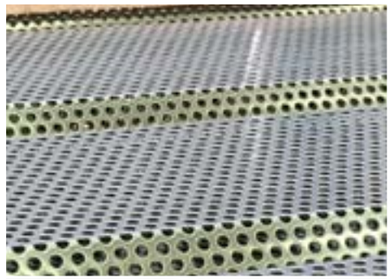
MTE Heat Shields have been independently type approved by Lloyds Register following witnessed testing at the Building Research Establishment Global (BRE) Testing Facility in Watford, London (UK).

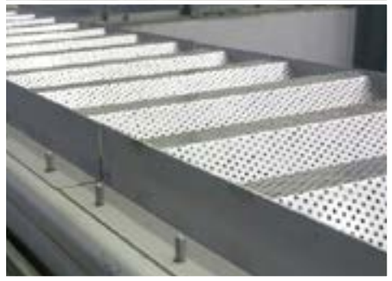
Testing was carried out with regards to Heat Flux reduction/ noise generation/wind speed reduction.

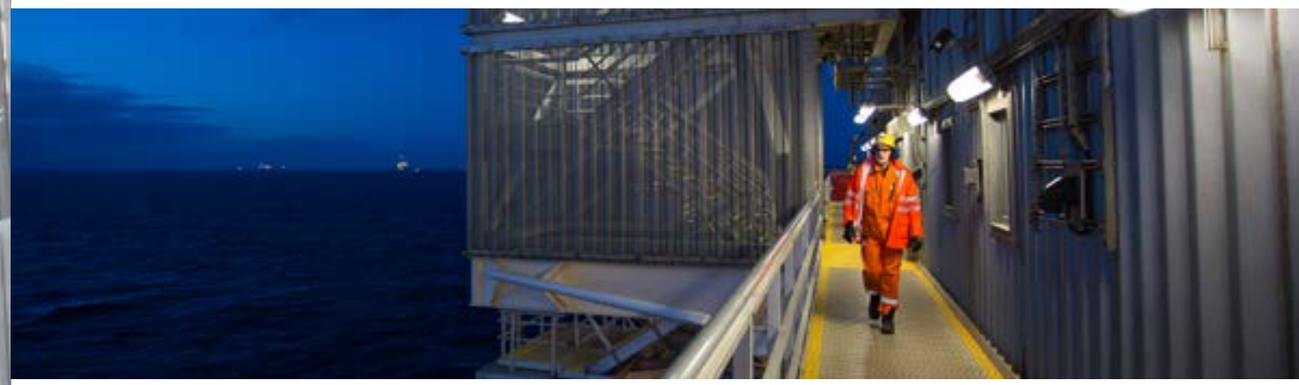
The perforated stainless steel plate construction provides a proven, strong, corrosion resistant and lightweight solution.

In addition, the perforated nature of the shields provides natural ventilation and visibility especially for Muster areas, Escape routes, Ladders and Stairtower applications. The lightweight perforated stainless steel system avoids the build-up of gases in safety critical areas and reduces operational requirements for gas detection or additional lighting systems.

Heat Shield systems can also be supplied in extreme high temperature grade stainless steel (310S) complete with load bearing walkway grating at flare stack platform areas to give enhanced performance in flare sensitive areas. The load bearing grade 310S walkway system is fitted to the high integrity Heat Shield panel system to allow for personnel to carry out periodical maintenance of flare tips.







MTE Heat Shields provide protection to personnel and equipment to the consequences of major hazard events at onshore and offshore installations, primarily those producing and/or processing hydrocarbons.

Typical single skin panel

Supplied in various open area options – 40%, 32% & 23% to give flexibility of system to suit clients individual project requirements and needs.

Panels are designed using an MTE standard profile of 80mm and are typically 1050mm in width and supplied as a framed or unframed option.

Typical double skin panel

Supplied as a 32% open area front skin coupled with an additional secondary perforated skin to give enhanced heat and wind velocity reduction values for use in extreme wind and heat conditions.

Panels are individually designed by MTE and are typically 1000mm in width as a framed panel.

Typical fixing details

Panels are pre-drilled prior to delivery so additional drilling work is reduced thereby speeding up the erection process and reducing site costs further.

Panels are supplied with fixed holes in the bottom member and vertical slotted holes in the top member to allow for panel expansion during periods of flaring / heat exposure.

MTE offer design calculations to prove heat flux and temperature reductions for given incident heat flux conditions and shield to object separation gaps, as well as structural calculations to prove the integrity of the design for any known environmental conditions.

MTE Heat Shields are pre-engineered tested and certified systems which benefit optimised weight and cost savings to the client.

Material and Construction

High performance, stainless steel construction providing a proven, strong, corrosion resistant and lightweight solution.

- Stainless steel grade **316L** or Grade SAF **2304** or Grade **310s**.
- Material thickness of primary shield to be **1.5mm** as standard.
- MTE offer 80mm deep unframed heat shields and 125mm framed systems.
- As standard MTE panels are supplied with isolation gaskets, which will provide a natural transition and thermal break between the stainless steel panel/angle and the carbon steel support structure.
- Framed panels are supplied with **pre-drilled** holes in the bottom member and **vertical slotted holes** in the top member to allow for panel expansion during periods of flaring / heat exposure.
- Attachment of the panels to the support structure is a simple bolted connection
- Fasteners to be stainless steel set screws grade A4 complete with gaskets, washers, ferrule and twin nuts, using M8 fixings for 80mm panels and M12 fixings for 125mm framed panels, to ensure secure fastening of the panel to the support steelwork.
- The panels do not require to be fixed together vertically – therefore allowing **ease of installation/removal/replacement** if required.
- As well as **removing the risk of noise generation** by vibration of fixed panels under wind load conditions
- All panels are **individually marked** to allow for ease of identification and installation

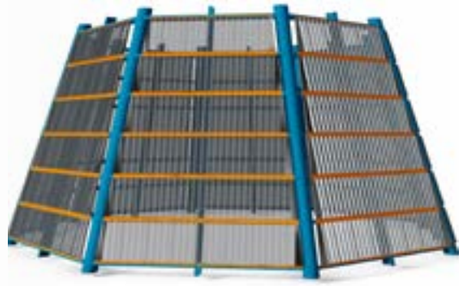
Typical Applications

- Drilling Derricks
- FPSO Turrets and Flares
- Drill Rigs
- Jack-up Rigs
- Workover Units

MTE panel systems offer additional protection for workover & drilling applications when utilised alongside existing / operational platforms where flaring is still in operation

FPSO Turret Protection

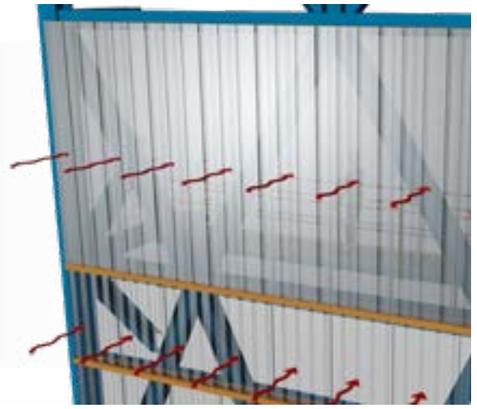
MTE panel systems offer protection to personnel and equipment within Turret areas from hazardous conditions – especially extreme flaring, storm and harsh environment conditions.



Derricks

Drilling derrick protection especially at the crown block and monkey board areas, where personnel carry out daily working and maintenance procedures.

Derrick applications can be found on offshore fixed or floating platforms, FPSOs and drill ships as well as many onshore drilling applications.



MTE Projects

Top:
SBM – White Rose – Turret Heat shields

Below:
SBM - White Rose - completed Turret Heat Shield

Opposite:
Azeri Derrick - Heat shields

Typical Applications

- Offshore and onshore flare systems

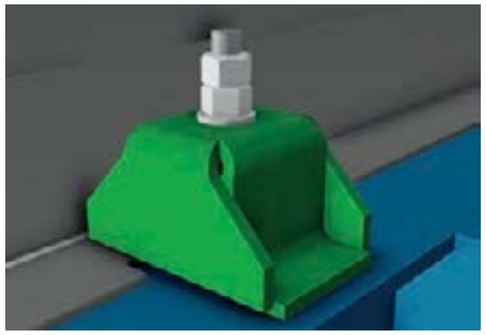
Flare Tip Heat Shield/Working Platform

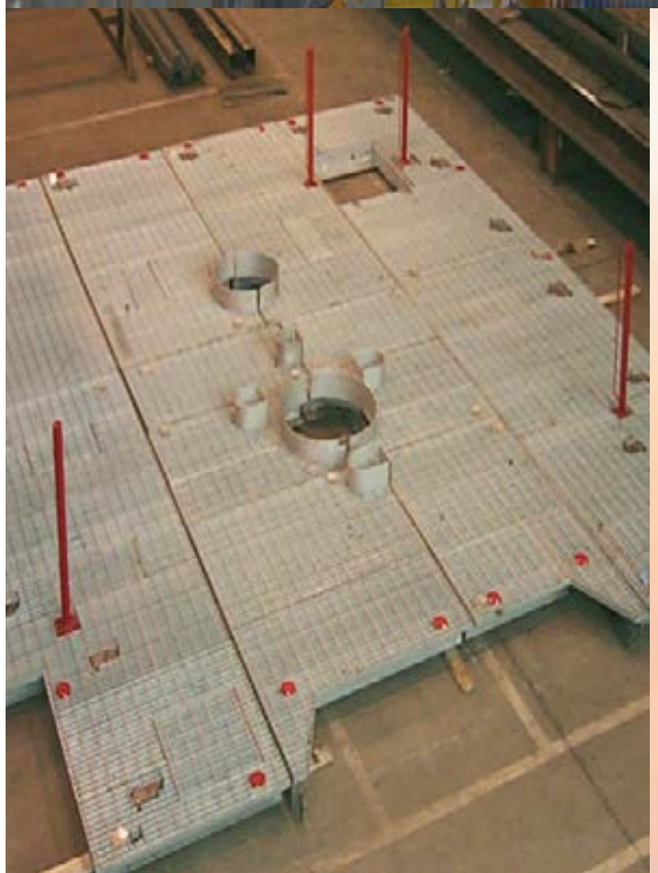
MTE supply a high grade 310S stainless steel system which has been specifically designed to meet extreme flaring temperatures.

The stainless steel working grating is designed to fit over an MTE Heat Shield panel to give a safe working platform for flare tip maintenance as well as giving high performance protection during flaring incidents.

Fixing Bracket

MTE's specially designed fixing system allows panels to be installed vertically or horizontally before the flare boom is erected into its final position.



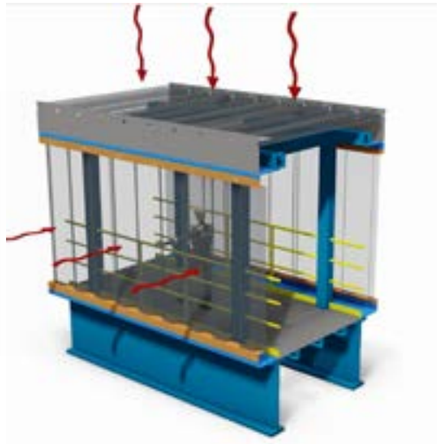


Typical Applications

- Offshore - Fixed platforms | Floating production units
- Onshore - LNG terminal | LNG process plants | Petrochemical plants

Bridge Links Between Platforms

MTE Heat Shields offer protection to personnel from heat or environmental conditions which allows for safe and easy passage on a daily basis as well as during emergency evacuation situations.



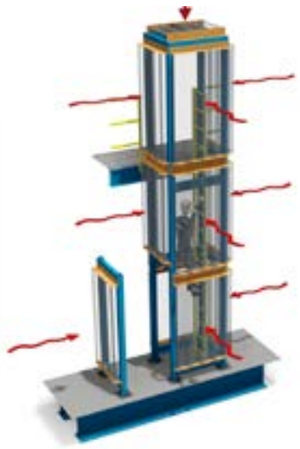
Staitower/Liftshafts

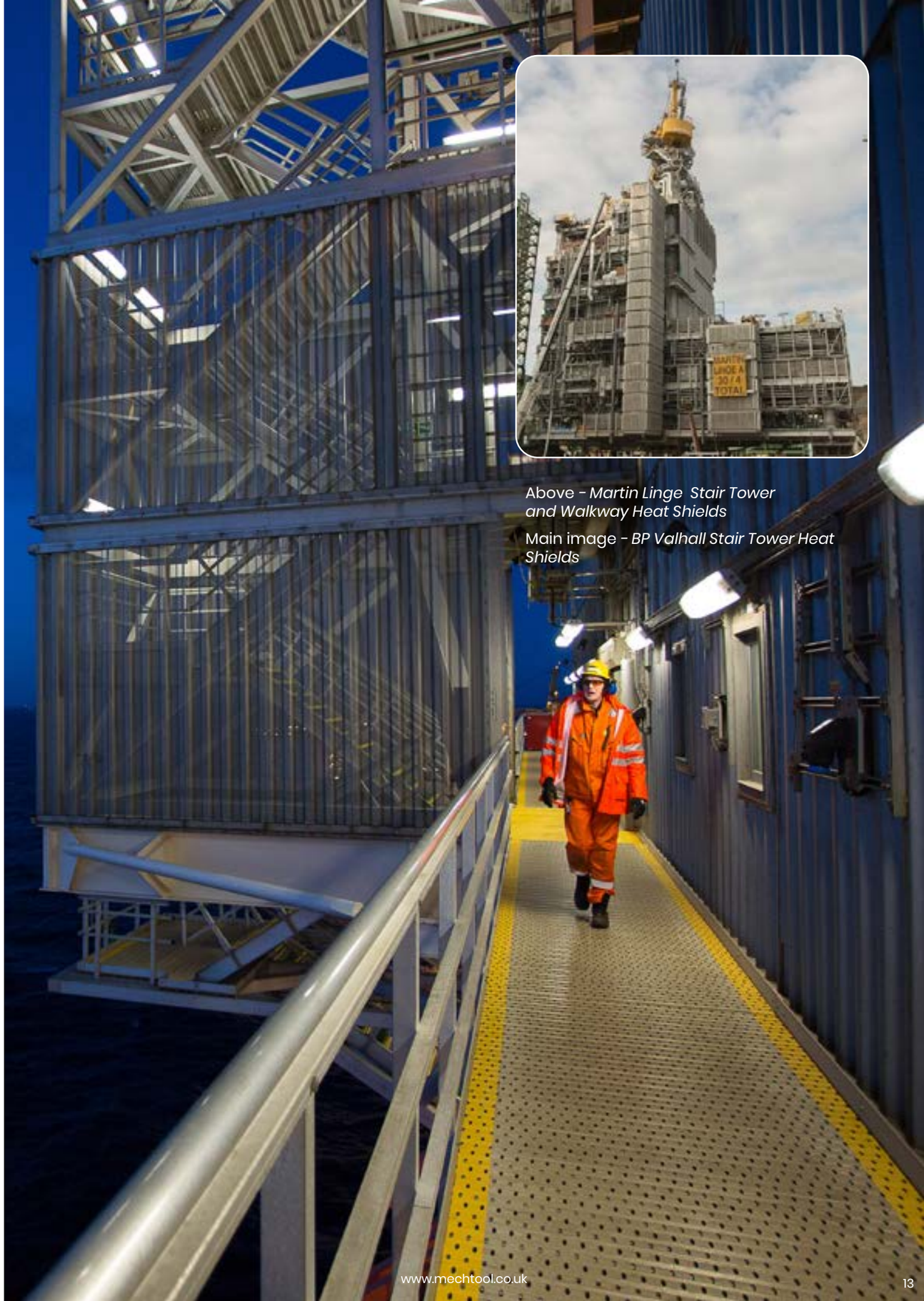
Protection is offered by our Heat Shields to personnel during daily operation in harsh environmental conditions and extreme heat situations. Heat Shields offer additional protection to personnel in emergency evacuation incidents within the staitower areas, providing natural ventilation and visibility.

Access Ladders

Our Heat Shields offer protection to personnel during daily operation in harsh environmental conditions and extreme heat situations.

Ladder systems can be supplied as a rectangular panel or designed to suit standard round cage style ladder systems.





Above - *Martin Linge Stair Tower and Walkway Heat Shields*

Main image - *BP Valhall Stair Tower Heat Shields*

GDF Suez Cygnus Stairtower Heat Shields

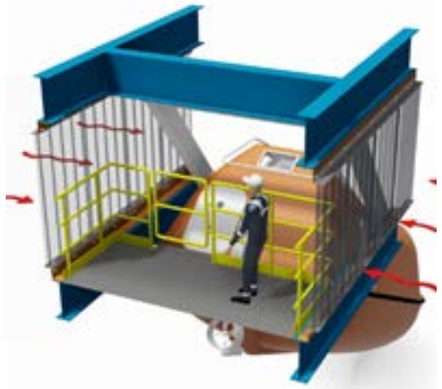
MTE designed, engineered, manufactured and supplied the stairtower Heat Shields and wind shields for GDF Cygnus gas field located in the UKCS.

Typical Applications

- Onshore / Offshore personnel muster points
- Life boat embarkation areas
- Life boat equipment protection
- Fixed and floating offshore vessels and platforms.

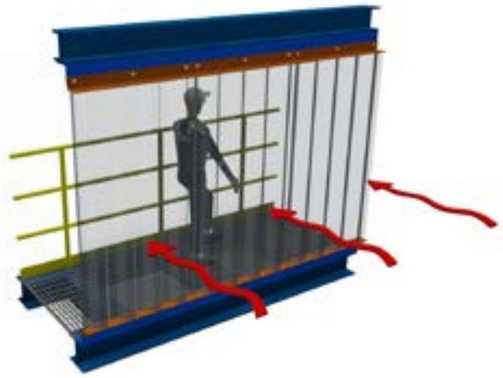
Muster Points

Protection is offered by our Heat Shields to personnel at safety critical areas to enable safe mustering and controlled evacuation to be carried out.



Escape Routes

Our Heat Shields offer protection to personnel from heat or environmental conditions which allows for safe and easy passage on a daily basis as well as during emergency evacuation situations.



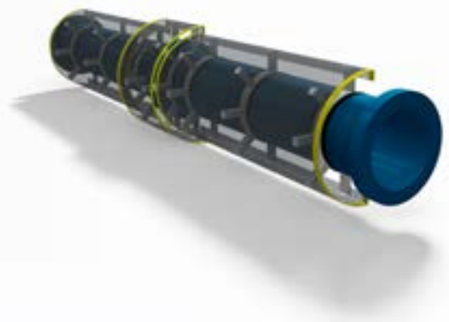
Equipment Protection

MTE Equipment Heat Shields offer protection to heat sensitive instrumentation, valve systems, and monitoring stations on offshore vessels/platforms as well as onshore petrochemical and process facilities.

Equipment Heatshields Brochure

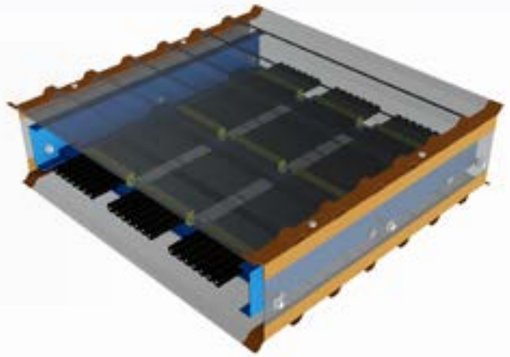
Piping Protection

Our Heat Shields offer a reduction in heat impact to sensitive materials within pipelines such as gasses or liquids as well as protecting structural piping at heat sensitive areas such as directly below flare platforms.



Cable Tray Protection

Protection is offered by our Heat Shields to sensitive cable systems from the effects of Solar/heat radiation which may reduce the operational efficiency of some electrical cable systems.



BP Valhall Redevelopment

Stairtower Heat Shields MTE designed, engineered, manufactured and supplied the stairtower Heat Shields for the BP Valhall Redevelopment located in the Norwegian North Sea.

Typical Applications

- Walkways • Platforms • Bridges • Vessels
- Pipe racks • Cable tray systems

Sunshade Panel System

Developed to act as a screen that will protect personnel and equipment from extreme environmental conditions and offer protection from solar radiation.

Fabricated from 100% offshore grade stainless steel and remain maintenance-free for the life of the installation.

Individually designed and engineered to meet clients requirements and specifications supplied complete with fasteners and gaskets to prevent dissimilar metal contact

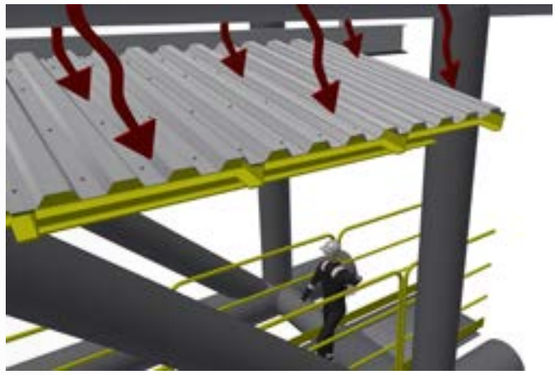
Systems have been tested to ensure fasteners in conjunction with the panel system meet the requirements of fatigue life when exposed to continuous wind buffering over the design life.

Design details and load calculations are supplied as part of the overall documentation package.

The standards, utilised BS, EN, DNV, NORSOK, API, AISC, etc. all have differing and various load and stress factors which will be designed for in line with the relevant applicable codes.

MTE have carried out wind fatigue load testing to prove suitability of MTE designed fixings, this was carried out in 2015 at the James Cook University in Australia. Wind suction effects that can occur on the sunshade panel systems can produce highly localised stresses at the fixings which could lead to displacement of panels if a fully tested fixing system is not utilised.

Whilst various design codes require some form of working stress or ultimate load check to determine adequate strength capacity of the cladding and fixing, none provide rules that assess its susceptibility to fatigue failure throughout its design life. Therefore the British Research Establishment (BRE) established a similar fatigue test more applicable throughout Europe and other non-cyclonic regions of the world. The BRE fatigue load spectrum was based on an ultimate wind suction pressure of 3.51 kPa which produced a maximum tensile (pull-off) force at any fixing of 1.47 kN



Testing and Certification

50+ years knowledge and expertise as the global leader in the design and build of high performance Heat and Solar Radiation Shielding Systems

- Independently Tested
- Witnessed by Lloyds Register
- Independent Verification of Performance (Lloyds Register – Design Appraisal Document)

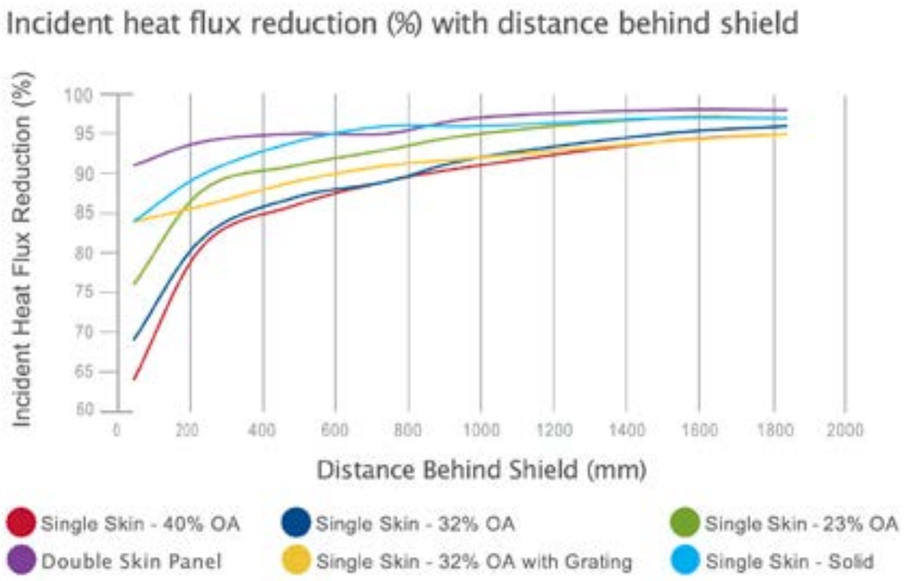
Heat Flux Reduction

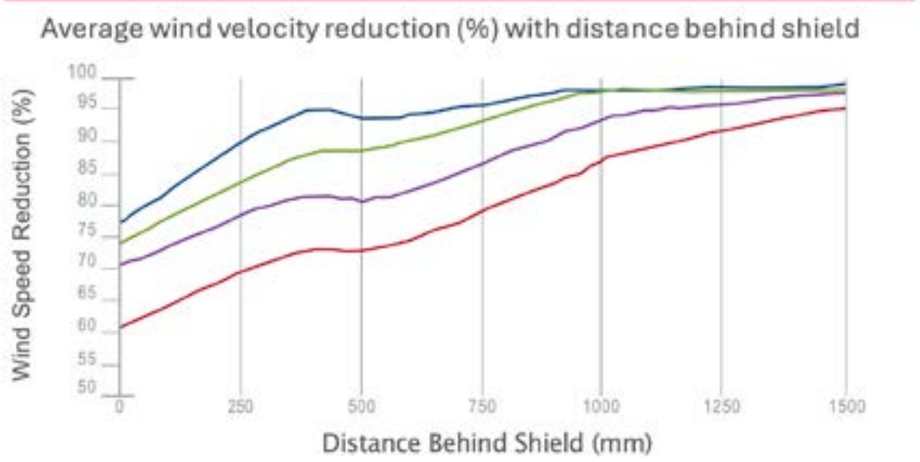
Wind Velocity Reduction

No Noise Generation

Benefits of MTE Heat Shield System

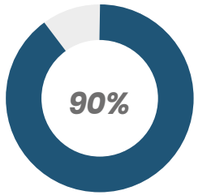
Heat Shields Performance Criteria



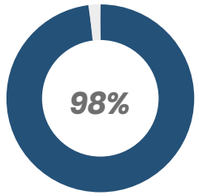


Performance

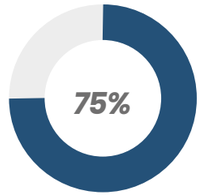
MTE's proven ventilated heat shield system can achieve:



Immediate reduction to incident heat flux in excess of 90%



Further improved and verified performance as distance behind the shield is considered. (Heat Flux Reduction & Wind Velocity Reductions up to 98%)



Immediate reduction to incident wind velocity in excess of 75%.

Maximum pressure on single skin perforated heat shield mbar

Panel Span	40% Open Area Primary Skin			32% Open Area Primary Skin			23% Open Area Primary Skin		
mm	1.5 thk	2.0 thk	2.5 thk	1.5 thk	2.0 thk	2.5 thk	1.5 thk	2.0 thk	2.5 thk
500	830	1106	1383	1026	1367	1709	1319	1759	2198
1000	207	277	346	256	342	427	330	440	549
1500	92	123	154	114	152	190	147	195	244
2000	52	69	86	64	85	107	82	110	137
2500	33	44	55	41	55	68	53	70	88
3000	23	31	38	28	38	47	37	49	61
3500	17	23	28	21	28	35	27	36	45
4000	13	17	22	16	21	27	21	27	34
4500	10	14	17	13	17	21	16	22	27
5000	8	10	13	10	13	16	13	17	21

Maximum pressure on double skin perforated heat shield mbar

Panel Span	32% Open Area Primary Skin		
mm	1.5 thk	2.0 thk	2.5 thk
500	975	1278	1593
1000	244	319	398
1500	108	142	177
2000	61	80	100
2500	39	51	64
3000	27	35	44
3500	20	26	33
4000	15	20	25
4500	12	16	20
5000	10	13	16

Proven Experience

Proven protection tailored to different high hazard industries worldwide backed by an end-to-end service.

- Design
- Fabrication
- Project management
- Testing
- Supply and certification

The global leader in radiant heat shielding systems for over 50 years

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