

B316 - EXTRUDED EXPANDED POLYSTYRENE TREATMENT - OPSS 316316.1 GENERAL

Frost heaving is caused by freezing temperatures acting on frost susceptible soil and free water below subgrade. The combination of these factors results in the formation of frost lenses which by expanding upward may cause substantial and costly damage in the pavement structure. Frost heave damage is particularly severe on roads in the northern part of the Province.

The placing of extruded expanded polystyrene sheets over frost susceptible soil prevents the penetration of frost beyond a predetermined depth. Although atypical, when it is decided to treat a frost heave without excavating, polystyrene is placed right on the surface of the existing pavement and covered with granular.

While polystyrene may not completely correct the frost heave problem, it should provide an improved ride as well as reduce the incidence of differential icing.

To reduce the effects of frost heaving in the area of the shoulder, the insulation is placed beyond the pavement width on to the shoulder.

316.2 REFERENCES

CDED B206-1	Earth Grading
CDED B206-2	Rock Grading
CDED B308	Tack Coat
CDED B313	Hot Mix Asphalt
CDED B314	Untreated Subbase, Base, Surface, Shoulder, Selected Subgrade, and Stockpiling
CDED B510	Removal of Asphalt Pavement

316.3 TENDER ITEM

Extruded Expanded Polystyrene Treatment (variation type, m2, PQP)

316.4 SPECIFICATIONS

The requirements for extruded expanded polystyrene treatment are contained in OPSS 316.

316.5 SPECIAL PROVISIONS

The designer shall refer to Chapter "E" of this manual to review the applicable special provisions.

316.6 STANDARD DRAWINGS

Standard drawings giving details of polystyrene treatment are contained in the OPSD 500 series.

316.7 DESIGN

The designer shall specify the following in the typical section of the Contract Documents:

- a) Grade and compressive strength of the insulation
- b) Excavation limits
- c) Insulation thickness and area to be treated
- d) Minimum depth of cover of granular base or subbase material to be placed over the extruded expanded polystyrene to allow for construction traffic (OPSD 514.010 and 514.020)
- e) Minimum thickness of granular base or subbase material to be placed over the extruded expanded polystyrene (Table 1).

Typical treatments are 25 mm in Southern Ontario and 40 mm in Northern Ontario. Increasing the thickness of insulation may result in an increased risk of differential icing.

Pavement structure within transitions (i.e. cut and fill area, non-uniform subgrade soil type) can increase the potential for frost heave due to differential icing concerns. Special attention is required when designing for the extruded expanded polystyrene treatment, and the designer should consider limiting this type of treatment to tangent sections avoiding curves, crests of hills, and intersections. A thin layer of Granular A layer over top or beneath the extruded polystyrene sheets helps with grading and subsequent placement of sheets and minimizes damage. Regional Geotechnical section should be consulted for alternative treatment recommendations.

The grade, which is based on the minimum compressive strength, is selected based on the induced load from the granular and pavement. This implies a stronger grade is selected when it requires a thicker granular cover.

Table 1
Minimum Depth of Granular Material over Insulation

Zone	Geographic Area	Minimum Granular Thickness (mm)
A	South of a line drawn from Quebec at Arnprior to Hwy 41 at Kaladar to Hwy 62 at Bannockburn to Hwy 28 at Woodview to Hwy 35 at Rosedale to Hwy 12 at Brechin, along the south side of Hwy 12 to Waubaushene, along the shore of Georgian Bay to Tobermory, and along the shore of Lake Huron to Sarnia.	400
B	Between Zone A and Zone C.	500
C	Between Zone D and a line drawn along the north side of Hwy 17 from Mattawa to the Hwy 17/144 interchange, to Hwy 108 at Elliott Lake, to the Hwy 129/554 intersection, to Hwy 556 at Glendale, and to the Hwy 17/552 intersection.	600
D	North of a line drawn along the north side of Hwy 66 from Quebec to Kenogami Lake, from Kenogami Lake to Chapleau, along the north side of Hwy 101 to Wawa, along the shore of Lake Superior to Nipigon, from Nipigon to Dryden, and along the north side of Hwy 17 from Dryden to Manitoba.	700

When extruded expanded polystyrene is to be placed directly on a pavement surface, tack coat must be applied.

316.7.1 Source of Information

The Regional Geotechnical Section will recommend locations where extruded expanded polystyrene for frost heave treatment is to be placed. The grade, type and thickness of polystyrene, as well as the depth of granular cover will also be directed by the Regional Geotechnical Section with the reference in Table 1.

316.8 COMPUTATION

This is a Plan Quantity Payment item.

316.8.1 Methods of Calculation

The unit for this tender item is square metre.

The area to be treated is based on the total length and width, measured horizontally, as per applicable standard.

316.9 DOCUMENTATION

316.9.1 Contract Drawings

All locations of extruded expanded polystyrene treatments are to be indicated on the contract drawings by stations.

The depth to the bottom of polystyrene below profile grade should be indicated by a note on the typical section of the contract drawings.

316.9.2 Quantity Sheets

The neat calculated quantities are transferred from the calculation sheets to the Quantities - Miscellaneous 1 sheet. This is a variation item, where each variation is entered in a separate column and heading on the quantity sheet. Individual quantities are entered in the appropriate column.

The variation parameter for extruded expanded polystyrene treatment is:
Thickness (mm) - 25 mm or 40 mm as specified in the applicable OPSD.

Quantity entries are made for each area (station to station) to be treated. Entries in each column are totalled. All column totals are combined to one total. This total is the tender total and is transferred to the tender documentation.

The following tender items may be required with the placing of extruded expanded polystyrene treatment:

- a) Earth and rock excavation (See CDED B206-1 & CDED B206-2)
- b) Granular base and subbase material (See CDED B314)
- c) Hot Mix Asphalt (CDED B313) or other pavement materials
- d) Removal of Asphalt Pavement (See CDED B510)
- e) Tack Coat (See CDED B308)

316.9.3 Documentation Accuracy

Stations are recorded in whole numbers.

Quantities are recorded to the nearest whole number.